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"Architecture—A Profession or an Art?"

WE give the words of the title of the volume of essays published under the editorship of Mr. Norman Shaw and Mr. Jackson * in the form which it appears to us that the title requires, to give it the point or meaning which is apparently intended, though we observe that the sign of interrogation is omitted in the printed title. The book may be taken to express the views of the architects who for convenience have been referred to as the "Memorialists," and consists of short essays on subjects connected with architecture and architectural training, by Mr. Norman Shaw, Mr. Micklethwaite, Mr. Reginald Blomfield, Mr. Bodley, Mr. Mervyn Macartney, Mr. Ernest Newton, Mr. E. S. Prior, Mr. John R. Clayton, Mr. Basil Champneys, Mr. Lethaby, Mr. W. B. Richmond, Mr. G. C. Horsley, and Mr. T. G. Jackson, the latter of whom also contributes a short introductory chapter.

Our first reflection on reading the book is that it is a very great pity that a set of essays containing so much that is true and well put, and so much real enthusiasm for architecture in its highest sense, should have been produced with a pronounced polemical motive which runs through it all, instead of being published solely as an effort to lead public opinion and taste towards a higher appreciation of the value and nobility of architecture as an art. As such it could have done nothing but good. But while the authors again and again assert that the Institute of Architects, instead of contending for the good of architecture, is contending for its own advantage only, no one who knows and has followed the discussions out of which the book may be said to have originated can help seeing that the authors of it are at least equally divided in motive between an enthusiasm for architecture and a desire to run down the Institute, and that under the influence of this latter desire they have been led into no little unfairness and a certain amount of what can only be called misrepresentation. Unfortunately the outside public, many of whom will read the book (which is a thoroughly interesting one), know nothing of the discussions which led to it and of the polemical motive which underlies it, and will be led to take as accepted facts what are really more like the partial representations of a counsel for the prosecution.

There are two points in particular in which the action and motives of the Institute of Architects in instituting an examination test for entry to its ranks is misrepresented, and in regard to one of these at least the misrepresentation appears to us to be quite inexcusable. It is asserted in two of the essays (Mr. Jackson's and Mr. Blomfield's) that the Institute was only influenced in its course by the activity of a mushroom society —they do not call it that, they speak of it as if it were a Society on a level with the Institute—which set up a cry for the compulsory registration of architects, and that the Institute has only been endeavouring to put itself in touch with a public movement and to turn the flank of the interlopers. Now the authors of both these essays obviously read the *Builder*, as they make several references to it; and if so, they certainly ought to know what was the real character of the abortive effort to get registration of architects into Parliament, what sort of people promoted it, and why it was that all men who understood anything of the matter and cared anything for the dignity and respectability of the "profession or art" set their faces against it. We spoke plainly enough on the subject, at all events. And now it is pretended by the memorialists that the Institute was utterly inconsistent and obviously acting from interested motives, because it opposed the Registration Bill, and yet wished for an examination test of its own. Cannot they see the difference? Are they really ignorant of the fact that one of the main provisions of the Registration Bill was to at once legalise and register every existing person who called himself an architect—in other words, to give a recognised status to every jerry-builder or estate agent who had chosen to put "architect" on a brass plate on his door? Do they really mean to say that the Institute of Architects ever contemplated anything parallel with that? If so, they are very much misinformed; and on such a serious matter it is surely the duty of those who write what the public will read to make themselves acquainted with facts and represent them accurately. Granting the principle that a fence to the adoption of the profession of architecture is advisable (which we pass over for the present), the idea of the Council of the Institute was that in process of time the Institute would, under their new system, consist of men all of whom had given evidence of a certain standard of technical knowledge and a certain standard of education in architecture, and that as this came to be recognised the architects would support it and the public would recognise it, and that the result in the end would be a gradual elimination of incompetent persons from the ranks of those called architects. There are of course objections which may be urged to this view, on general principles—reasonable objections; but to say that this is on the same footing with a proposal to give a Government status, at one swoop, to every "architect" who has a brass plate on his door, is thoroughly unreasonable.

The other point is the persistent assertion, repeated in several parts of the book, that the Institute professes by its examination system to protect the public from bad architectural design. It has never, so far as we know, made any such profession. It has only professed to protect them against being taken in by so-called architects who have no education or training such as would justify them in assuming the name: that is all. It can no more protect the public from bad architectural design than the Royal Academy can protect it from bad pictures; and, as far as we have observed, it has never made any such profession. The fact is that the claims of the Institute in regard to its examination have been exaggerated by the memorialists for the purpose of strengthening their case, on the system always employed by "counsel for the prosecution." That there has been a certain amount of talk on the subject from individual members of the Institute, which is in bad taste, is true enough; but it is not fair to make the Institute officially responsible for that.

* Architecture—A Profession or an Art: Thirteen short essays on the qualification and training of architects. Edited by R. Norman Shaw, R.A., and T. G. Jackson, A.R.A. London: John Murray. 1892.

Mr. Norman Shaw's paper, the first after the Introduction, deals with "The Fallacy that the architect who makes design his first consideration must be unpractical." We really did not know that any such fallacy existed, except among such people as Lord Grimthorpe and his admirers, but we quite agree with what is said in the latter part of the chapter, that "a true architect is far more likely to be a practical man, than a practical man to be a true architect;" and that Brunelleschi and Wren, who were capable of magnificent architectural conceptions, were also men of great practical attainments; we should hesitate about Mr. Shaw's inclusion of Michelangelo's name in the same list, as the construction of his great dome failed sufficiently at least to show that he was not master of his subject as Brunelleschi and Wren were. This and much else in the chapter is quite true. It is quite true that "to force such questions as drainage and knowledge of materials into the foremost position, placing design and all that makes the art glorious in the background, betrays either the absence of all due sense of proportion, or else it is a mere subterfuge to draw attention from the really important question." But who wants to do this? Not the Institute in its corporate capacity certainly, and the insinuation is unfair if made in that sense; although there are plenty of individuals in the Institute, some of them in the habit of making themselves prominent in season and out of season, to whom it may apply only too well.

We have every sympathy with Mr. Shaw's views about "professionalism,"—that it is not the professional side of architecture "that ever has or ever could give a human soul one ray of pleasure"; that "what we so earnestly desire is that architects should be architects: surely no unreasonable demand." If by "professionalism" Mr. Shaw means the sort of architects who sit in offices writing, while draughtsmen make their designs for them, we hold up both hands for him. But with all this Mr. Shaw cannot but admit that "an architect is an agent, that though he is employed and paid by his client, he has duties to discharge to the builder who is working under him no less important than those he owes to his employer; should he allow bad workmanship to pass, or should he allow the builder to fail in carrying out any part of his contract, he becomes personally responsible to his client. On the other hand, he has to control his client's demands." Now all that is certainly business rather than art, and as Mr. Shaw admits its importance, it seems that he must admit what can only be called the professional element into an architect's work, after all, and the admission clashes oddly with the sentence on the next page, that the art of architecture "is on precisely the same footing as painting and sculpture." It may be open to question whether it is on quite the same footing even as an art, but in practice at all events it is an art hampered with business considerations from which sculpture and painting are free, and in practice these cannot be separated from the art, except by the device of having two partners, one to plan and design and the other to supervise contractors' work and accounts; a division of labour which we believe is not unknown. And while Mr. Shaw on one page speaks of architecture as a pure art, on another he admits that the architect is practically hampered by business matters which are certainly of the nature of "professional" work.

This effort to lift modern architecture, as one of our French contemporaries observed, "into the region of pure æsthetic," runs through the whole book, and is in fact the ostensible pretext for the attack on the Institute, which wishes, it is asserted, to put this purely intellectual art into leading-strings. Yet the first and leading essayist is obliged to admit a great deal into his scheme of an architect's work which is not art. Mr. Jackson's paper on "True and False Ideals in the Education of an Architect," so far as it keeps to the subject indicated by its title (all the writers in the volume seem to claim a right of rambling a good deal), of course urges that it is a low ideal to study only to pass an examination. There we agree with him fully. But does it follow that students who enter for the Institute examination (or for any other examination) should necessarily take this miserable view of the matter? Mr. Jackson seems to leave out all idea that an examination programme may be a very useful landmark to a student. One young architect wrote to us from Scotland a letter in which he declared that the Institute programme for examination was the first real guidance he had had in his studies, and that he considered "it would be a lode-star to thousands." Amid the various references to our columns among the essays, we have not seen any reference to that letter,* which we think most of the writers must have seen, and which certainly was one of the most pointed and practical contributions to the correspondence on the subject which we have published.

Mr. Jackson draws a terrible picture of the future of the young architect who has passed the Associateship examination, and who "is dubbed architect and admitted to the ranks of the Institute:"—

> He is now a person whom the public can employ without fear of "costly disappointments," and if he rests on his laurels and thinks he knows as much as he wants to know, the fault is not his. He goes through life respectable and respected; designs a large number of buildings with the aid of a good staff of assistants and perhaps some useful ghosts behind them; he does not meddle much with art, but he acts as a middleman between his employers and the carver, the glass painter, and other working artists, whose ideas he adopts as his own; he shows his interest in architecture as an amateur might by attending meetings and hearing papers on art of an archæological character, and after maintaining the profession he dies wealthy.

This is too true a description of many a "professional" architect's career in the past generation, and perhaps some to come; but we should deny that such a career has anything necessarily to do with the fact of having passed the Institute examination. Mr. Jackson and his friends seem determined to regard the examination as intended to reduce every one to a dead level, whereas it is simply a starting-point, and individual genius and character are no more dwarfed or interfered with than before. The whole picture appears to us to be an imaginary sketch of a "bogey" which does not exist, or at all events need not exist, in any such connexion. There is far more material for thought in the further portion of the essay. Mr. Jackson revives the view (it is not a new one) that it is far more important that architecture should cover the whole field of ordinary building—that every building should be architecturally interesting,—than that a limited number of great architectural works should be designed and built. There is a wholesome truth in this, but it is pushing it rather too far to say that to the rustic homes of England her beauty is far more due than even to her halls and mansions, and to speak of "the lovely fanes in which the life of English architecture pulsates even more strongly than in her Cathedrals." It is good to recognise fully the beauty possible in small churches and even in cottages. But is it really true or reasonable to argue that we could better spare our great cathedrals than our cottages? And in regard to the latter, does the author give full value to the influence of time and association in the interest they have for us? One of our cathedrals would be a glorious work if we saw it in fresh-hewn stone, depending only for effect on its innate grandeur. Would it be the same with the cottages if we saw them brand-new, divested of the touch of the hand of time? It is much to be doubted. The painter of to-day, it is true, is "never tired of painting them," but how much of his interest in them is owing to the manner in which time and weather have harmonised them with the landscape? The deduction presented to us, however, is that we ought to direct more of our efforts towards raising the character of the every-day building of the country, the mass of buildings which are carried out by builders and where no architect is employed. Mr. Jackson thinks there is something pathetic in the way in which builders, left to themselves, strive to produce something that will pass for architecture, imitating the style of some architect who has gained a reputation: "a bit of cut stone, a Gothic capital, or a terra-cotta plaque, in situations for which they are quite inappropriate, are necessary to their happiness." In a sense it is pathetic, but not quite in the sense here suggested. Mr. Jackson seems to think that these architectural efforts on the part of the builders spring from a desire to be artistic. It would be pleasant as well as "pathetic" to think so, but we fear it is nothing more than a persuasion that better rents can be got from houses which make some pretence to be architectural. It is nothing more than a matter of trade; and it is surely rather paradoxical that Mr. Jackson should be so contemptuous towards the architects who think chiefly of making a living, and so indulgent to the builders who only do the same thing in a still worse way.

We fear this is only a sample of the feeling that runs through the whole volume: anything, even a jerry builder, is better than an Institute architect. Mr. Jackson goes on, in a very eloquent passage, to suggest that it would be a really great work if the Institute would endeavour to teach the everyday builder to do something better; but he says, "We may imagine the shock such a proposition would cause in Conduit-street." We believe there are plenty of people "in Conduit-street" whom the proposal, in the spirit in which Mr. Jackson makes it, would not shock in the least; but they would perhaps ask the question, which he leaves unconsidered—how is it to be done? How are the builders to be taught? and will they come and be taught? And what machinery has the Institute at its command for such an undertaking? There is a more practical tone in the suggestion that young architects who have not any immediate prospect of success in the usual way, should go into partnership with builders and give them the advantage of their superior taste and attainments. As he says, "there need be no social descent in this. The day is happily come when a man is judged more on his own merits than on the accidents of his position." We believe there are cases in which this kind of partnership has been carried out; but it necessarily all depends on the builders who have the capital, and the advice should rather have been addressed to the builders, who "have the call," as one may say, than to the young architects. And the latter would find in almost all cases that their "superior taste and attainments" were valued only in proportion to their power of bringing in money to the firm; hardly a very dignified or desirable position. Mr. Jackson's summing up is to the effect that the Institute should cease to be an Institute of Architects and become an Institute of Architecture, that it should found a great National School to which every one connected with building could have access, that it should "think more of the good of architecture and less of the profit and position of the architect, and, throwing the dignity of the profession to the winds, set itself seriously to the task of raising building throughout the country once more to the level of an art." This is unquestionably a noble programme, "worthy," as Mr. Jackson says, "of every society"; but in regard to the founding of the National School the Institute has neither machinery nor funds for such a work, which could only be done by public money; and as to the latter exhortation, there are not a few men, and those the best and most able, in the Institute, who would sympathise in every respect with the views here propounded, who have no unreasonable views about "professional dignity," and desire good architecture before everything

* Signed "Epictetus," and printed in the *Builder* for December 26, 1891, pages 488–9.

else; and surely Mr. Jackson would have done better in helping them than in throwing stones at them all indiscriminately, merely because they belong to the hated Institute.

Mr. Micklethwaite's chapter on "Architecture and Construction" is a very good one, though the truths in it are not very new, and he again surely exaggerates in his pessimism in saying that "many" of the "eminent architects are well known to be practitioners in building so completely without knowledge of architecture that they cannot direct the draughtsmen whom they employ." There are such persons we believe; but surely "many" is one of the exaggerations which are continually cropping up in the pages of this enthusiastic and not very logical volume. And it is a serious thing to throw out exaggerated statements of that kind to a public which is only too ready to accept them. Mr. Micklethwaite is absolutely right in saying that "if our towns are ever to become what they might and ought to be we must make the public wish to have them so." We have said this over and over again, and some others of the writers in this volume speak as strongly on this point, but here again they are at variance with Mr. Norman Shaw, who declares that "what the public want is good architecture, buildings which would interest them and afford them real pleasure, and which would be a daily source of that delight which beautiful architecture has always excited among intelligent human beings." Here is optimism indeed! We can only say we heartily wish it were true. Our sadder conviction is that the great public of this country care nothing whatever about architectural beauty. It is quite true, as Mr. Shaw says, that no enthusiasm can be raised by mere professionalism, or the parade of being "practical men." But the English public do not want their enthusiasm raised: they have, in regard to architecture, no enthusiasm to raise, and as for caring about the difference between art and "professionalism," most of them do not even understand in what it consists. That is just one of the great difficulties in the way of the improvement of our national architecture, as others of the contributors to the volume fully recognise.

If the reader endeavours to gather from this volume a general conception of what the writers consider an architect is or should be, he will find them not quite in agreement there either. Generally speaking the favoured view is that of the architect as Master Builder or master craftsman, the "Mediæval" view, as we may call it. The architect should be much more on the building than he is; and the idea is renewed again that if we would only give up drawing and work with our hands there would be a revival of real architecture. This is a wholesome and a manly ideal; better no doubt than that of sitting in an office and writing letters; but it is a question, in the first place, whether it is not Utopian under present conditions of life, and in the second place, whether it is after all an essential condition to the production of the finest architecture. It is the Mediæval, but not the Greek theory; from the manner in which the Greek buildings are designed it is obvious that they must have been thought out and drawn out first; and Greek architecture is, in refinement at least, at the top of all architecture we know of. Mr. Norman Shaw here again differs from the prevailing view of his colleagues, and we think with more truth. "Who ever heard," he says, "of a clerk of works being an authority on architecture. . . . . It is the *architect* we want, the man who has in addition to all necessary practical knowledge the power of design." Mr. Basil Champneys also, whose essay on the "Relation of General to Technical Education" contains some admirable remarks, says that "the relation of the architect to his subordinates is more or less that of a Minister to a Department of State, and that he is not the most effective minister whose mind is most possessed of technical detail." Mr. Jackson "charges" in directly the opposite direction, and wishes the architect to be practically a kind of clerk of works; and Mr. Lethaby, in his essay on "The Builder's Art and the Craftsman," hints that the artists connected with various crafts will probably not much longer consent to submit to "the dictatorship of the organised and organising architect." If this means anything, it means that each artist on the building is to have a free hand and follow the dictates of his own feeling. Nothing could be worse for the total result. It has been tried at the Panthéon, where the first French painters of the day have done each as he pleased, in the decoration of the building, with a result of ghastly incongruity; and to let all "crafts" artists have their own free hand independent of the "architect" or chief builder would produce the same kind of incongruity. In fact, this idea strikes at the root of all architectural design in the true sense. Another point we must notice in Mr. Lethaby's essay is his remark about a profession "which discountenances architects approaching work nearer than in the capacities of agent and draughtsman," with the reference, "see *Builder*, December 19, 1891, p. 459." As we knew we could have written nothing of the sort, we turned to the passage with some curiosity, and find the reference is to a paragraph about a Furniture-making Society of which Mr. Lethaby and other architects are members, in which we suggested that it was exceedingly illogical for architects to be in the position of recommending their clients to purchase furniture from a commercial company of which they were members, and that the rule of the Institute which forbids its members from having any commercial interest in materials and manufactures connected with building is a sound one. We never said one word against architects designing furniture for their clients, only against their having a commercial interest in the sale of it. We presume that Mr. Lethaby does not appreciate the distinction between what we really said and what he implies that we said: but the public who are the architects' clients will be quick enough to perceive it.

Thus the authors are in no accord with one another as to what an architect is, and they have further complicated the subject by calling in the assistance of a painter, Mr. Richmond, who makes the usual kind of assertion we hear from painters nowadays, that a man who can delineate the beauty of the human form can do anything in art, "he can design a picture, make a statue, or build a cathedral." Mr. Richmond admits that this is a startling assertion, but says "it has been proved over and over again to be true." We should have thought the contrary had been proved over and over again. Michelangelo made a constructional failure of St. Peter's dome, which Raphael had previously confessed to be absolutely too much for him. There is scarcely a painter before the public who can draw architectural detail correctly; sculptors cannot make a decent job of the mouldings of a pedestal for their own works,—in France this is so generally recognised that they always join an architect in the commission; and Stevens's Wellington monument, a rather exceptional example, is to some extent spoiled by bad mouldings and weak decorative detail, which no one who had thoroughly studied architectural design would have been content with.

The memorialists complain that sculpture and architecture have been divorced. We do not think they ever were one, but we think architecture and engineering once were, and that the real mischief of the day, as we have long ago said, is that we have two classes of constructors, when we ought to have only one, and ought to see every work of engineering a work of architecture also, and every architect capable of building a viaduct as well as a street house. That alliance would do more to raise architecture than for architects to aim at being sculptors, which they cannot be, to any purpose, without neglecting their proper work; the two arts are entirely different in their process and conditions, and a man who tries to do both is only likely to be either a poor sculptor or a bad architect.

There is a great deal in this book with the spirit of which we cordially sympathise, as long as the writers keep away from the polemical matter which has been, unfortunately, the moving cause of the production of the volume. Whenever they get to that, they are nearly always unfair or paradoxical. No doubt the flag of examination has been flourished too much by the champions of the Institute, and it is open to question whether the same result of keeping up the standard of membership could not have been attained without an examination test, as it is in the Institution of Civil Engineers, a body which every engineer finds it almost necessary to be a member of, on pain of being regarded with doubt as to his professional acquirements. On the other hand, as we have already pointed out, an examination programme is calculated to give an exceedingly useful indication of a line of study for young students, the value of which some of them have already acknowledged, and it was certainly founded with the best intentions. But the temper and tone with which this well-meant effort is spoken of in the book before us is really too absurd for serious consideration. To tell people that a Society which has instituted a test examination in architectural training is "doing its best to degrade the art of architecture," and has "aimed a dangerous and insidious blow at architecture itself," is going beyond all the bounds of reasonable criticism. It is remarked that "if in England architecture is to regain the place which in France it has never lost, it must be by the effacement of its professional character," while the fact is that the French "Société Centrale" is to the full as professional a society as the Institute, and that numbers of French architects are now demanding a Government diploma for practice, of a much more exclusive kind than anything which the Institute has proposed. It is complained that "business proficiency" is a new element not recognised in the Institute Charter; but the Institute here again is on the same lines with its French neighbours, who have recently advocated the establishment of a professorship of architectural account-keeping in the École des Beaux-Arts itself. One writer picks out an advertisement which we published by a person calling himself "A.R.I.B.A." who advertised for business, and adduces this as an instance of "the use to which the Institute diploma will probably be turned." The case was, as any one might see, a purely exceptional escapade of an unprincipled person, who had really been struck off the Institute rolls some time before. Is this what can be called fair fighting? It is asserted that the public have never demanded protection from incompetent architects. We presume people who say so have never read the *Times*, which is an adequate expression of average public opinion, for twenty years back, or they must know the contrary. We do not say average public opinion is right in its view; the public may perhaps be better protected in other ways; but the fact that it has made the demand is incontestable to those who read newspapers. In fact the public, if they do not care for architecture as an art, at all events see that, however much it may be an art, it is one complicated with questions of safety and healthfulness of construction, which cannot safely be left in the hands of any and every one who may feel an ambition to express his artistic soul in architecture. Another contributor to the book, again, objects that asking a candidate for a design will only show one example, "whereas an architect has to be able to design for all legitimate occasions." Of course; but one design will probably show whether he has any notion of handling design and expressing it on paper. Another writer points out triumphantly that it is quite possible for a man to write "F.R.I.B.A." after his name, who is no more than an estate-agent and a collector of rents. It *has* been possible, and that is the very

thing the Institute is now doing its best to prevent, and it is held up to odium for doing so!*

We half suspect that the real cause at the bottom of all this polemical fencing is to be found in the curious tendency in England which leads a few men, in other instances as well as this, to refuse all association with constituted bodies and maintain a position apart. Thus there are painters who always speak with contempt of the Royal Academy as a body which only works for the injury of art; and the older writers in this book are men who have always stood aloof from the Institute of Architects, and who seem to have used this question of examination as a newly-discovered stick to beat it with. And while we repeat that there is much about architecture in the book with which we cordially sympathise, and which members of the Institute would do wisely to read and consider, the polemical portion of it is mostly unreasonable and often unfair, and we are still of the opinion that the authors of these essays would have done far more for the good of architecture in England if they had joined in endeavouring to make the Institute of Architects the influence for good which it might be, instead of banding together to describe it to the public as a "bogey" barring the way to all future progress in architecture.

THE LIFE AND WORKS OF DR. WERNER VON SIEMENS.†

THE author of this work, an elder brother of the late Sir William Siemens, so well known in England, was the founder of the fortunes and reputation of the family. He was for some years in military service, distinguishing himself especially in scientific work; but about 1848 he left the army, and devoted himself entirely to scientific pursuits, chiefly in the domain of electricity. He established, in conjunction with Mr. Halske, a manufactory for electrical apparatus, which soon acquired very large dimensions, the firm growing famous for the number of valuable inventions and improvements introduced by them, as well as for the enormous amount and high quality of the work they supplied. But, independently of his connexion with this establishment, Werner Siemens became celebrated for his labours and researches in science generally, and many honours were conferred on him. In 1860 the University of Berlin gave him a Doctorate; in 1874 he was elected a member of the Royal Academy of Sciences, Berlin; he was afterwards created a Knight of the Prussian Order "Pour le Mérite" (the highest scientific honour in that country); and in 1888 he was raised to the rank of nobility by the Emperor Ferderick III.

Being deservedly popular among the German people, a desire has been expressed that an account of his life and works should be published, and he has agreed, in the first place, to reprint his most important writings; and, secondly, to furnish materials for an account of his life and work, with a history of the renowned firm of which he was the founder.

A first volume of "Wissenschaftliche und technische Arbeiten" appeared in Berlin in 1889, and a second in 1891; a demand speedily arose for a second edition, and steps were also taken for their translation into English. That of the first volume is now before us. It is devoted to "Scientific Papers and Addresses," and forms a large octavo book of 450 pages, with a portrait and many illustrative wood-cuts. It contains forty-two papers, some of considerable length. They begin as early as 1845; some of them are on subjects that have no general interest now, and others only treat of trifling matters of technical detail. We may select the following for remark:—

A paper, dated 1845, "On the Application of the Electric Spark to the Measurement of Velocity," mentions Siemens's work for the Prussian Government in the earliest successful attempts to introduce this method of measuring the velocity of projectiles; a method which has since received such a remarkable development, not only for gunnery experiments, but also for other measurements of exceedingly small intervals of time. He showed that by its means an accuracy of $\frac{1}{100000}$ of a second could be easily obtained; and he prophesied that the instrument might be used to measure the velocity of electricity itself. The electrical chronoscope has now become one of the most essential aids to scientific investigation.

The electric telegraph, in various forms, occupies, of course, much space. Two long papers on Telegraph Lines and Apparatus, dated 1850, furnish a full historical record of the extensive and valuable work done by the author and his firm at a very early period. Other papers on the duplex telegraph, on electro-static induction and retardation, on the velocity of transmission of electricity in suspended wires, on the conductivity of carbon, on the theory of electro-magnetism, and so on, comprehend such a mass of technical detail that it would be hopeless to attempt any abstracted notice of them.

The subject of submarine cables, which for many years excited so much interest in the public mind, and called for the earnest study both of scientific theorists and practical engineers, comes into notice in several papers. One was presented in 1860 jointly with his brother to the British Association, on a subject then much controverted, "The Principles and Practice of Testing the Electrical Conditions of Submarine Cables;" another, in 1874, read before the Berlin Academy, gave a history of Siemens's earliest subaqueous lines, followed by an elaborate mathematical investigation of the intricate problems arising in the operations of cable-laying.

Three papers in 1860 and 1866 contain discussions, largely mathematical, between the author and others on the production of a unit of electrical resistance, and in 1863 we find a notice of the preparation and distribution, by the manufacturing firm, of the unit proposed by Dr. Siemens, namely a column of mercury 1 mètre long and 1 square millimètre in section at zero centigrade. The British Association took part in this matter.

In 1860 Dr. Siemens gave, in *Poggendorff's Annalen*, an account of some curious phenomena he had observed on a visit to the great Pyramid of Cheops. The weather was fine, and he, with some engineers engaged in laying the telegraph line in the Red Sea, ascended the pyramid, when, somewhat to the annoyance of the party, they found themselves caught in the peculiar dust storm known as the Khamseen. We may give his description of what he saw:—

> Arrived at the summit we felt a sharp, cold wind blowing; the red of the south-western horizon was changed to a colourless clouding-over right up to the zenith, so that we could only observe nearlying objects in feeble outline. It was interesting to observe the sand of the desert, which covered the plain with an opaque yellow veil, continually rising with whirling motion higher up the pyramid. When it had arrived at the highest step we noticed a peculiar whistling noise, which I ascribed to the increasing violence of the wind; it was similar to that of surging water. We thought at first that the Arabs were uttering this sound, but I soon satisfied myself that it also took place when I stood on the highest point of the pyramid and held my forefinger in the air. There was also a slight pricking observable in the skin of the finger which was exposed to the wind. I could only explain this fact, observed by all of us, as an electrical phenomenon, and such it proved to be.

He then tried to establish this, producing with an extemporised Leyden jar strong spark and shocks, which made the Arabs believe he was engaged in sorcery. On further investigation he found that the phemonenon might be fully explained by the action of the sand, which was the carrier, and probably the cause, of the electricity.

In 1866, he published an essay on "The Law of the Motion of Gases in Tubes," with a description of the pneumatic mode of despatch of messages laid down in Berlin. Everyone knows how much the electric telegraph system in London is aided by the despatch of messages in small tubes by pneumatic pressure. This system was applied by Siemens in Berlin on a much larger scale, with tubes laid down in the streets, and this paper is an essay on the principles guiding the action.

At page 217 of the book is given a copy of a paper laid before the Berlin Academy of Sciences on January 17, 1867, having for its title, "Ueber die Umwandlung von Arbeitskraft in elektrischen Strom, ohne permanente Magnete." This has become classical as the first publication of the great discovery by Werner and William Siemens of the principle of electro-magnetic augmentation and maintenance of a current without the aid of steel or other permanent magnets, the immediate result of the discovery being the production of one of the most wonderful of modern instruments,—the dynamo-electric machine, or, as it is now more briefly called, the *dynamo*. The German paper was followed by a corresponding one presented by William Siemens to the Royal Society of London on February 4 of the same year. The full history of this invention has been published in the English Life of Sir William Siemens.

Several papers in 1875-6-7 treat of the peculiar property of selenium, of conducting electricity better in light than in darkness. It may be recollected that Sir William Siemens in 1876 exhibited at the Royal Institution what he called a selenium eye, which was sensible to light and to difference of colour. The phenomena are here fully investigated.

A paper presented to the Berlin Academy in 1878 is called "Physical and Mechanical Considerations, suggested by the observation of an Eruption of Vesuvius in May, 1878." This observation led Dr. Siemens to some most elaborate speculations, which not only embrace the action of volcanoes specifically, but extend to the structure of the whole globe, and to the history of its earliest existence, with criticisms and remarks on the theories of Lord Kelvin and many others on cosmical matters generally. It is impossible in regard to this to do more than refer to it as an exercise of deep thought and ingenious reasoning; and the same may be said of another paper of 1883, "On the Admissibility of the Assumption of an Electrical Solar Potential, and its Importance for the Explanation of Terrestrial Phenomena," the title of which sufficiently indicates its general nature. A paper of 1882, "On the Luminosity of Flame," had for its object to settle some doubtful points on the source of light emanating from highly-heated gases.

At the end of the book are four papers, 1886 to 1890, "On Winds and Currents in the Earth's Atmosphere." The author says:—

> "The interdependence of meteorological phenomena has been very closely studied by meteorologists during the last ten years. There exist on this subject an almost unwieldy mass of observations, on which several ingenious theories have been founded. These deal, however, mostly with secondary phenomena, and rest therefore on a narrow foundation. It would appear, indeed, as if modern meteorology had somewhat neglected, for these special studies, the investigation of the first causes of the observed phenomena. . . In the following pages it will be attempted to supply these deficiencies by the light of this doctrine of the conservation of energy."

The subject is thoughtfully and scientifically reasoned out, and the theory of the winds which the author arrives at is laid down in clear propositions.

It is customary, when a new member first attends a meeting of the Royal Academy of Sciences, for him to make an "Antrittsrede,"

* Among other things we observe Mr. Jackson says that "Mr. Farrow, eminent as a 'coach,' has told us publicly that as a matter of architectural education the preparation for the Institute examination is perfectly useless (meeting of the Architectural Association December 11, 1891)." As our report of Mr. Farrow's speech contains no such expression, we have referred the point to him, and he says explicitly that he never used such an expression, and that it does not represent his opinion.

† "Scientific and Technical Papers of Werner von Siemens." (Translated from the second German edition.) Vol. I. Scientific Papers and Addresses. London: Murray, 1892.

or entrance speech; and we may give a few extracts from Werner Siemens's, as an example of the modesty of pretension which so often characterises true merit, as well as a somewhat ingenious form of allusion to the connexion of Science with practical occupations. He said:—

"The Academy, by admitting me among its members, has done me an honour which I have not sought, and was not entitled to expect. Up to now only those savants were called to these chairs,—rendered venerable by the high scientific attainments of former as well as present occupants,—whose sole vocation was science, and who had successfully devoted to it the whole of their intellectual power. . . . . The Academy, by choosing me, has deviated from this system; it has considered a man worthy to enter its ranks whose professional activity appertained neither to science itself nor to scientific teaching. . . . . I am not presumptuous enough to think that the contributions I have made to pure science have alone been decisive for this. I believe, and I take comfort in the conviction, that more weighty considerations have influenced the Academy. I account for it by the circumstance that, thanks to better education and to the greater development of mental intercourse, scientific knowledge and method are now no longer confined to the narrow circle of the professional scientist, but exert their animating and fructifying influences over larger circles of the community. They have been introduced as essential factors into the teaching profession, into official life, into the manufactures, into agriculture, even into most of the trades. Science is now, as it were, the nervous system which runs through the organism of human culture, which generates new life in its finest, hardly visible ramifications, and not only increases thereby the ideal good of mankind, but lightens the hard fight for material existence by pressing into its service the still unknown forces of Nature. To this last object of scientific activity my exertions have been always directed. My problems were generally prescribed by the demands of my profession, because the filling up of scientific voids which I met with presented itself as a technical necessity."

The second volume will contain technical and other papers on domestic and industrial progress at home and abroad; and the third will give an account of the author's remarkable life and career.

NOTES.

THE question which has arisen in the London County Council, namely, whether the Council shall do certain work without the intervention of a contractor, is of considerable practical importance. Theoretically, the Council has a perfect right to undertake any work without making use of a contractor, but in practice it is doubtful if the result will be satisfactory. Nearly all the railway companies, who are bound to do the best they can for their shareholders, put constructive work in the hands of contractors, and experience would thus seem to be against the Council, so to say, becoming its own contractor. A great deal of extra responsibility and work must be thrown on the officials of the Council, who will have to purchase materials, engage workmen, and so forth. "The proof of the pudding is in the eating," but we shall be surprised if, even locally, the ratepayers find any satisfaction in what may be regarded as a new departure if it comes to pass.

ONE of the arguments of the advocates of the eight-hours' movement is that the change would so far benefit the workers, physically, that they would probably produce as much in eight hours as they formerly did in nine. The opponents of the measure, whether prepared to grant this or not, need not seek to disprove it; for, if granted, it simply upsets another contention of the eight-hours' men—that the reduction of hours would give work to the unemployed. But if either side care to avail themselves of it, they may adduce an argument bearing on this phase of the question from a statement made by a contemporary in discussing the miners' "stop day." After observing that the policy of restriction of output by means of a stop day has been pronounced a failure—a six-days week having been quietly resumed at the beginning of this month—the result to the men and to the coal-owner is considered. Many of the former (especially those engaged in duties outside actual coal-getting) soon murmured audibly at being compelled to go about doing nothing, whether they liked it or not; while the coal-owner is represented as very quickly discovering that the weight brought to the bank was almost equal in the five days to what it had been in the six! It is curious to notice the different light in which the compulsory element in the eight-hours' day proposal is regarded by the miners of different counties. Mr. Cowey, President of the Yorkshire Miners' Association, has just declared that his society will tolerate no "local option" about the Bill, and that it should regulate all underground labour. Other bodies, which are at present inclined to hold aloof, would probably fall in line readily enough if the proposals savoured less of fetters; but they are preparing, not unnaturally, to jealously guard their independence. There is no doubt that a considerable amount of unanimity prevails regarding the demand in the abstract,—though even that is anything but complete,—but as to detail there is sufficient diversity of opinion to effectually wreck the Bill altogether.

A MEETING is to be held at the Mansion House on the 27th to assist in finding funds for further "restoration" of Rochester Cathedral, which has no special fabric fund. The restoration was commenced by Sir Gilbert Scott a good many years ago, and it is now proposed that it should be continued under the direction of Mr. Pearson. From a circular sent to us we get an idea of the extent of the work proposed to be done. "A few years ago," it is stated, "the west front was found to be in a perilous condition demanding immediate underpinning and repairs. These are in a fair way of completion, and it is proposed to rebuild the upper halves of the two flanking towers destroyed about 130 years ago. The scheme includes the raising of the roofs of the choir and its transepts up to the gables which Sir G. G. Scott restored. It includes, also, works of reparation and restoration in the parapets and roof of the nave, in the interior of the aisles and transepts and elsewhere in the church." It is to be hoped that no more alteration will be made in the existing old work than is really necessary for substantial repair. To the rebuilding of portions of the towers which have been destroyed we have no objection to raise. The raising of the choir roofs to the line of the restored gables seems now to be rendered architecturally necessary, as the gables have been built; whether it was worth while to restore these gables is another question; but they are there now, and look absurd without the roofs, no doubt. But in this matter of restoration we seem always to creep on from one alteration to another, the last thing which was done affording a plea for going further.

THE contemplated improvements in the Strand will not be complete,—will, indeed, lose much of their value,—unless the access to South London by way of Waterloo Bridge is much improved also. To add more traffic to the existing east and west traffic of the Strand and Fleet-street, by opening a street from Holborn, will be to add to rather than to relieve the present block, and easier access to the bridge and to the Embankment is of the first importance, and should be provided before the proposed new street through Clare Market is made. This can be best effected by isolating Somerset House, by removing all the shops and houses reared against it on the Strand and east sides, and making a good street to the embankment by the side of King's College, and taking away the few shops on the Strand side and building up a new front in character with the rest of the building, setting back or rounding off the corner of Wellington-street leading to the bridge. An alteration of this kind, carried out in the spirit of the alteration now going on at the National Gallery, would be an admirable improvement to both Somerset House and the Strand, and it would safeguard the building from fire, of which it stands at present in considerable risk from its contact with tumble-down property and the proximity to a theatre. Somerset House is at present occupied by Government offices, but with the concentration of Government work at Westminster which is going on from year to year, the building might in the course of a few years become available as a Town-hall for the London County Council, which has shown some desire to locate itself in the immediate neighbourhood. The proposal to build offices at the Strand end of the proposed new street from the north is open to question from an artistic point of view, as a high and large block of buildings (and even a wide street) near St. Mary's Church will dwarf the church and spoil its present charm, which is quite as much dependent on its surroundings as on its structural merits. If the County Council were to offer the Government to build a good and appropriate front to Somerset House on the Strand side it might provide itself with offices which would perhaps be sufficient for its present wants, and it might be able later on to buy out (by giving a site in Westminster or otherwise) the Government Department occupying the rest of the building. In this way the County Council would secure a Town-hall or Hôtel de Ville worthy of the large and rich community it governs, and it would, at the same time, be relieved of the "itching palm" for the City Guildhall, which is so marked a feature of the programme of the more progressive members of the Council, and which for many reasons is not to be encouraged. In any case, good and indeed necessary improvements would be effected by such a course as we have suggested.

THE Head Master of Rochester Mathematical School, in a letter to the *Times* of Monday, utters some words of common sense which may well be borne in mind by those antiquaries who are ready to put the preservation of every ancient piece of wall before the most pressing needs of the present day. It appears that a well-known archæologist had written to the *Times* about the "Vandalism" (the usual cant word) contemplated by the governors of the school, and stating that it was proposed to demolish a long length of the existing city wall, which was wholly unnecessary, as the dining-room which it was proposed to erect might be equally arranged in another place. The head master replies:—

"The only piece of the Mediæval wall of which anyone in Rochester has taken any care is that in possession of the school. It is eighty yards long, and includes a very perfect corner tower. Of these eighty yards it is proposed to remove eight. The reason for removing this small portion is that it cuts obliquely across the ground upon which the governors are erecting, not a dining-room, but a large three-storey building, with a depth of 36 ft., and a frontage to the East-gate of 100 ft. This building will contain a large school-hall, a gymnasium, and an extensive suite of science and art rooms. They are rooms which we have long wanted, and which the school has fairly earned, and they cannot be erected in any other position, all the available ground at the rear being already occupied with our class-rooms and other offices. It is practically a question of which is the most important to modern Rochester, a few extra yards of interesting but perfectly useless Mediæval walling or a properly equipped higher modern school."

Mr. Brock appears to have been making the mistake so often made by the Society for the Protection of Ancient Buildings, of running a tilt against "vandals" before being sure of the facts; and the comparison made between the value of the old work to be removed and the objects of the new buildings to be erected suggests that more moderate and reasonable view of the claims of ancient remains, which archæologists so often injure their own cause by ignoring.

THE Clerkenwell Vestry propose to let upon a building lease the site of a quaint little tenement in Farringdon-road, on the eastern side of what was formerly Ray-street, being a parish watch-house, built in 1794, and so used during twenty-six years afterwards. The watch-house is, or was until lately, No. 18, and bears a slab with an inscription stating it is the property of the parish, 1835. A massively-built arch of brick under the shop floor covers the basin of the ancient Clerks' Well,—the *fons Clericorum* mentioned by FitzStephen in the description of London which he added to his account of the life of his master, St. Thomas à Becket. No. 16, adjoining southwards, marks the position of the pump which was fixed there in 1800, and against which they placed a memorial-stone setting forth that the well lay 4 ft. to the east.* In Radolph Agas's map, supposed to have been drawn in 1560, the Clerks' well is plainly drawn as pouring forth out of the wall of St. Mary's de Fonte nunnery into a cistern or trough, which Stow describes as being "curbed about square with hard stone." The Parish Clerks, who here performed their scriptural plays, were incorporated in 17 Henry III., by name of the Brotherhood of St. Nicholas, and rank as the fifty-fourth Company of London. To them we owe a useful and now somewhat scarce volume, "New Remarks of London," 1732. The nunnery pleasance covered the steep slope down to Vineyard-walk, Peartree-court, Hockley-in-the-Hole, and the bank of the Fleet, which in this quarter was called the River of Wells. In 1673, James, third Earl of Northampton, bestowed this spring upon the poor of St. James's parish. In later days they made a paupers' burial-ground, alongside of Ray-street, opposite the watch-house. That graveyard has, in turn, given place to local improvements, when the greater part of Ray-street was pulled down, in 1856-7, for the laying-out of Farringdon-road. Over its site passes the Metropolitan railway-line, opened from Farringdon-street to Paddington on January 10, 1863.

THE *Quarterly Review* contains an article on "Rapid Transit in London," compressing together a good deal of interesting statistical information. The *Quarterly* adopts the view that we cannot look for increased rapid transit in any way except by underground railways, overhead railways being obviously impossible in London as it now exists, while there can be no doubt that, even if possible, they are a serious injury to the houses near which they pass and a constant hindrance and inconvenience to ordinary vehicular traffic. The *Quarterly* therefore naturally sums up in favour of the projected electric railway schemes, by which it says the need can adequately be met, but with the serious question "whether they can secure sufficient traffic at remunerative rates, and work it with sufficient economy, to pay interest on the necessary cost of construction. . . . . Capital will certainly not be forthcoming if each new undertaking is to be exposed to conditions of construction and of working more onerous than the last, still less if it is to be called on to carry a large proportion of its passengers at nominal fares, or to be threatened with the competition of rate-aided tramways" (a possibility which had been glanced at on a previous page of the article). We have already expressed a doubt whether the proposed tubes deep beneath the ground will prove an attractive method of conveyance, it may even be questioned whether the getting down to and up from them by the lifts will not waste a good deal of the time saved in rapid transit. We may have to learn that in a city like London, crowded up on old lines of narrow streets, there is a limit to getting about quickly which we shall have to recognise. But the article in the *Quarterly*, on a subject of so much public interest, is worth reading.

* We are informed that the spring still rises in a house close by to the west, and that they have to dispose of the overflow by pumping it away. On the high ground, at the rear, is Fox-terrace.

WE do not know whether we are to take it as an example of the energetic policy of the new management of the *Pall Mall Gazette* that it annexed on Tuesday last a "Note" from this journal on Greek archæological exploration, without a word of acknowledgment. If so, we may as well hint to that and other "enterprising" journals of the same kind that our objection to piracy of this kind, if persisted in, will not be confined to mere remonstrance.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.*

THE principal features in our report this week are the details of the two schemes which have been laid before the Commission,—one the utilisation of the Kennet valley for the construction of a large reservoir, involving the submersion of villages and the diversion of roads, a railway and a canal, and the other the construction of nine smaller reservoirs,—both projects being designed to maintain the flow of the Thames, while enabling the Thames companies to take more water from the river. The Kennet Valley scheme is proposed on behalf of the water companies, and the nine reservoirs scheme on behalf of the Thames Conservancy. It is understood that the Commissioners have before them a third scheme for a reservoir which will differ from the other two in not augmenting the flow of the Thames, and in being directly connected by pipes with the companies' filters. Before giving the details of the two proposals we conclude our summary of the

Evidence of Sir Frederick Bramwell.

Asked to state the considerations which guided him in taking 26 gallons per head rather than 32 gallons as the average of daily consumption, Sir Frederick said the New River Company was down to 28-26 for all purposes, and between 1856 and 1866, notwithstanding increase in population, that company reduced the quantity of water delivered. Then he was a director of a suburban company, sixteen miles from London, which delivered 17 gallons per head for all purposes, including road water; and it was a constant supply all day to houses with baths and gardens. He asked the Commission to infer that when the existing sources were economised it would be better to spend money in improved inspection than in new works. The New River would have to come down from 28½ to 26; the West Middlesex, from 29 to 26; the Southwark and Vauxhall, from a little over 28 to 26; and the East London would have to make a large reduction. This could be done without powers such as Parliament might be unwilling to give. The water fittings regulations were sufficient for the purpose, and the Lambeth Company, using waste-water meters, had found that they could effect reduction with existing powers. Asked whether, the people of London having been accustomed to consume large quantities of water, there would not be a difficulty in bringing down the consumption, Sir Frederick objected to the use of the word "consuming," and said that the people had never "consumed" these large quantities of water. They did not know that this large provision had been made for them. The waste-water meters showed how water was flowing away during the night while people were asleep; and there was an equal waste during the day; but people did not know of it. The waste arose from the original insufficiency or present condition of the fittings.

Would continuous inspection cope with continual wear of fittings? Yes; because waste-water meters would detect the 10 per cent. of cases in which it was necessary to interfere. He would not restrict the quantity of water to be taken; if a housemaid chose to take ten pails of water when five would suffice, let her do it, but do not let the water run to waste unknown to the consumer. London might be regarded as thoroughly provided with water-closets, but there was room for baths to increase with the desire for them in a class of houses where they did not have them now. The increased use of water on this account would be large actually, but not relatively to the whole population.

With regard to the gravel supply of the Lambeth Company, leaving all legal questions out of account, it should certainly be regarded as water taken on its way to the Thames, diminishing the flow at Teddington weir. A portion may make its escape below Teddington; but the ordinary presumption would be that by that quantity the flow is diminished.

In speaking of water consumption in the United States, the fact was sometimes overlooked that the United States gallon is only five-sixths of the Imperial gallon. In a district of the town of Charlestown, in the United States, the consumption per head was 44·5 English gallons in the daytime, and in the night-time 32·6 English gallons. Deacon's meters were applied, and, after three rounds of inspection, the consumption per day was reduced to 22 English gallons, of which the night rate was 8·9, leaving 13 for the day, or half a gallon more than before. The whole saving came out of the waste that was going on day and night of water which never came into the hands of the consumer. In a report, the Charlestown Board complained of the consumption of 92 of these gallons daily, and said it had been their constant study to diminish this extravagance, and if the consumption could be reduced to 50 English gallons, the capacity of the works would be sufficient for many years.

In a conversation about fittings, Sir Frederick expressed the opinion that London fittings were fairly good; but in the district of the East London Company he admitted that the Engineer, Mr. Bryan, had a terrible task before him.

The question was put whether hot-water apparatus was not a fruitful source of waste. Sir Frederick said that that waste was small, and it was due to the improper setting up of the apparatus. If it were set up with a lot of dead ends so that that which should be hot water stays when it is not being drawn off, and becomes cold, and you have to draw off a lot of cold water before you reach the hot, then that was a source of waste. This was much too common a sort of fitting, but it might be forbidden by law. What had to be done was to take care that you have your hot water on the run, and then you got it immediately without waste. In many towns hot-water pipes and baths were being put into houses of much lower rental than formerly,—in Edinburgh as low as rentals of 16*l.* and 18*l.*,—and, of course, this must increase the consumption of water.

Asked what he would do in cases where taps were allowed to run all night on dirty clothes, he said he imagined the law could stop misuse of that kind; and, if it would not, the legislature would supply the needed remedy. He afterwards cited section 17 of the Act of 1863, which imposes a penalty of 5*l.* on any person wilfully and negligently wasting or misusing water.

The Kennet Valley Reservoir Scheme.

Professor Henry Robinson, C.E., submitted to the Commissioners a scheme for appropriating the valley of the Kennet to a large reservoir and two small ones, with the object of ultimately maintaining a minimum flow of 600,000,000 gallons per day in the Thames by providing for the storage of 44,000,000,000 gallons. The plan involves the diversion of some miles of canal, the diversion of 10½ miles of railway, including three railway stations, and the submersion of several miles of public roads, two villages, and several private residences. The water could not come to London by gravitation, but must come down the river, the proposal being to discharge into the river sufficient to leave a minimum flow of 300,000,000, when the companies have taken 300,000,000 gallons.

In his statement the Professor said that he had been instructed by Messrs. Hollams, Sons, Coward, & Hawksley, on behalf of the London water companies, to submit to the Commission his views as to the possibility of augmenting the water supply of the metropolis by the conservation of the flow of the river Thames, when it was abundant, for use when it was not. It was possible to accomplish this and to effect an improvement in the river by constructing a reservoir in the Kennet Valley. The gaugings of the total flow are:—

	Million gallons per day.
The late Mr. John Taylor, 1853 to 1880	906
The Conservancy, 1883 to 1889... ...	1,350

The former include long droughts; the latter

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 418, 435, 456, 480, 503; and current volume, pp. 10, 29, 47, 71, 82, 103, 126, 298.

accord with independent observations. On August 14, 1887:—

	Million gallons.
The minimum flow at Teddington was	153·9
The companies' abstractions were ...	101·0
Total, say	255·0
To maintain a minimum flow of ...	600·0
Would require a reservoir to hold ...	44,000·0

This would provide 300 for 10,000,000 of people at 30 gallons a head, and raise the minimum flow at Teddington from 153·9 to 300. The storage required is, according to Mr. Taylor's gaugings, 44,000,000,000 gallons; according to the Conservancy's gauging, 30,000,000,000 gallons. If there were no droughts greater than those of 1884, the proposed storage would keep the discharge up to 700, and give 100 more for the supply of the metropolis.

The witness proceeded,—"From an examination of the Thames Basin, I am of opinion that the Kennet Valley is admirably adapted to the construction of a storage reservoir of the required magnitude. The gathering-ground from which the River Kennet is supplied is very sparsely populated, and five-sixths of the area is on chalk, and, therefore, free from the action of floods in washing down polluting matter from the surface. The rainfall on this area is about 30 in., which is considerably above the average of the Thames Valley. The gathering-ground from which the Kennet reservoir would be supplied is 350 square miles. Owing to the high rainfall the average annual discharge of the River Kennet may be safely taken at about 10 in. on the entire gathering-ground, which would yield over 50,000,000,000 gallons per annum, or, say, 1,000,000,000 gallons per week. The average amount to be impounded per annum to provide for the maintenance of a minimum flow of 600,000,000 gallons per day would be ten weeks' flow, or 10,000,000,000 gallons, which is only one-fifth of the average annual discharge of the Kennet. This amount is arrived at from an examination of the gaugings of the river Thames from 1854 to 1889. The average time of the water-level rising in the reservoir would, therefore, be ten weeks per annum. During an average of twenty-two weeks per annum the reservoir would be overflowing. The regulation of the discharge would be carried on during the remaining twenty weeks. The plans and sections, which are appended, record in detail the data that I have obtained, upon which I have founded my confident opinion that a storage reservoir can be constructed in the Kennet Valley. This area is now being remapped by the Geological Survey, and Mr. J. H. Blake, of the Geological staff, who is stationed at Reading, has seen the results given in my plans and sections, and agrees with them. It will be seen that the original mapping was incorrect. The Geological Survey Map, Sheet No. 12, and the Geological Survey Sections, Sheet No. 81, give what was supposed to be the geology of this area, but the section in the neighbourhood of Thatcham, represents the chalk lying on an even slope, whereas recent well sections have proved the existence of a wave which is most conspicuous at Thatcham, and extends several miles eastward. The error in the section at Thatcham has apparently led to the incorrect mapping of the Reading beds all along the valley, from Beenham House to Thatcham. The extent of the error reaches its maximum at the sharp bend of the valley near Woolhampton, where the base of the London clay is shown crossing the Bath-road, at a level of 220 ft. above Ordnance Datum, whereas the actual level at that point is about 138 ft. above Ordnance Datum (see Section No. 8), showing a vertical error of over 80 ft. The great point that has now been determined is that the basement bed of the London clay stretches right across the valley for about five miles, proving that the whole thickness of the Reading beds exists beneath, which establishes the watertightness of the bed of the valley. As the mottled clay of the Reading beds extends both up and down the valley beyond the London clay, the River Kennet runs over a clay bed for a distance of nearly eight miles."

The Professor submitted a plan on the scale of 1 in. to a mile, which showed the area between Reading and Newbury. The position of the reservoir is indicated by a line 230 ft. above Ordnance Datum, which represented the top water level of the reservoir. The upper chalk reaches Ordnance Datum, 1½ mile from the south-east side; the top of the chalk is 50 ft. above O. D. at the south end, 100 ft. at the north end. The bed of the Kennet, where it crosses the site of the proposed dam, is 160 above O. D., or nearly 90 above the chalk. The strata of the 90 include 20 of alluvium and gravel, 40 of mottled-clay, and about 30 of irregular bedded sand and clay. A plan, 6 in. to the mile, shows in detail the positions of the out crops crossing the valley. The intervening portion is entirely a London clay. The Reading beds are from 70 ft. to 90 ft. thick. Above them exists a continuous bed of mottled clay, from 35 ft. to 50 ft. thick. This is the bed on which he relies to make the reservoir water-tight. Having described in detail a number of sections, he says that the levels of the chalk water in various wells afford conclusive evidence as to the continuity and water-tightness of the mottled clay. The Professsor continued, — "The main bank of the proposed Kennet reservoir would be 1¾ mile in length. The maximum depth of water in the reservoir would be 63 ft. over the bank of the river, or about 70 ft. to the river-bed. The top of the bank would be 235 ft. above Ordnance Datum. It would have a curved masonry and concrete wave screen wall along the water-side. The top of the wave-screen would be 10 ft. above the water-line. The bank would be 40 ft. wide at the top, with a public road along it. The slopes would be 3 to 1 on each side for a vertical distance of 20 ft., below which level the slopes would be flattened out to 4 to 1, bringing the bottom width out to 544 ft. at the banks of the river. The inner face of the bank would be covered with stone pitching. A puddle trench, having a maximum width of about 25 ft., would be carried down through the valley gravel, alluvium, London clay, and water-bearing Basement beds, and would be bonded into the main bed of mottled clay. The puddle tunnels extending along the water-bearing beds, as shown on the Sections Nos. 6 and 7, would be extensions of the puddle trench. The water-bearing stratum between the mottled clay and the London clay requires to be dealt with, and I propose to carry down the puddle trench under the main bank through it, and to bond the puddle into the main bed of mottled clay. From the north end of the bank a tunnel would be driven along this stratum up to a point where the top of the mottled clay reaches the proposed top water-level of the reservoir. This tunnel would be puddled throughout, by which the reservoir would be rendered absolutely water-tight on the north side. From the south end of the bank a similar tunnel would be driven a distance of about two miles in the direction of Sherborne St. John. The mottled clay only rises to the top water-level at a distance of nearly seven miles from the bank. The tunnel, however, need not be extended that distance to arrest any possible leakage. By constructing this two miles of puddled tunnel, any leak would have to travel round the end of the tunnel before it could reach the nearest outlet, and the distance it would have to travel would be about six miles. Taking the head in the reservoir at 60 ft., the hydraulic gradient could not exceed 10 ft. per mile. An examination of the springs from the water-bearing streak shows that the natural hydraulic gradient in this bed varies from 15 ft. to 40 ft. per mile. These figures have been arrived at by taking cases where springs are thrown out from the bed at a considerable elevation above the nearest low-lying outcrop, or by taking the difference of level of the water in two wells supplied by the same source. It follows from these facts that it would be impossible for there to be any appreciable leakage round the south puddle tunnel. The Upper Kennet reservoir bank would be one mile in length, with a waste weir extending 200 yards beyond. The width at the water-line would be 70 ft., with slopes of 3 to 1 on both sides, pitched with stone. The maximum depth of water would be 30 ft. on each side. The puddle trench would be carried down to the mottled clay. The road would be 10 ft. above the water, and would be carried over the weir on brick arches. The Enborne bank would be about 820 yards long, having a depth of 30 ft. of water on each side. The width of the water-line would be about 130 ft., the slopes being 3 to 1. This width is necessary to provide for carrying the canal and the road. The puddle trench would be carried through the alluvium into the London clay, which is about 60 ft. thick under the bank, and covers the entire area of the Enborne branch reservoir." The land to be submerged is, it is said, singularly free from buildings. There are no churches or graveyards within the area, and only two villages would be interfered with,—Aldermaston and Woolhampton. The population disturbed would be 500 or 600. The Hungerford and Newbury Branch of the Great Western Railway passes up the middle of the valley. The necessary diversion of the line along the north side of the reservoir would be about 10½ miles, or slightly shorter than the existing line, and would not involve any sharp curves or steep gradients. The present stations of Aldermaston, Midgham, and Thatcham would require to be moved. The estimate includes the entire cost of the diversion, together with three stations, to be placed wherever the company may prefer to put them. The Kennet and Avon Canal, which now passes down the middle of the valley, would have to be diverted and carried along the side of the reservoir, with a flight of locks descending the hill near Ufton-green. From the south end of the bank the canal would be carried in one level reach (at or a little above the top water level of the reservoir), to Ham Lock, Newbury, crossing the Enborne Valley on a bank, which would be made water-tight to keep back the water in the Enborne branch reservoir. The users of the canal would draw all the water they require from the river as at present, before it discharges into the reservoir. The amount required is not likely to exceed 3,000,000 gallons a day.

The water supply of Reading is at present drawn from the River Kennet. If the proposed reservoir were constructed the flow of the river at the present intake would be interfered with, and a different supply would have to be provided. The population of Reading is about 60,000, so the amount of water required would be nearly 2,000,000 gallons per day, and it might be obtained from the gravel beds which overlie the chalk to the west of Theale, where the water comes up from the chalk, and would not require filtration. An alternative or supplementary water supply for Reading could be given direct from the Kennet Main Reservoir through a special pipe under the control of the Reading authorities. The amount required is comparatively so trifling that it would have no appreciable effect upon the general working of the reservoir. The volume required for the water supply of Reading and for feeding the canal would not exceed 35,000,000 gallons per week, or 3½ per cent. of the average flow of the Kennet.

The Bath-road would be diverted along the north side of the valley. The existing roads from Brimpton to Thatcham and Aldermaston would be preserved by carrying them across the reservoir on the banks which retain the water in the Upper Kennet and Enborne Reservoirs. Two other roads would be carried across the Enborne Reservoir on Viaducts. All the roads leading from the hills to the valley would be connected by main roads along the sides of the reservoir.

In an account of the working of the scheme, Professor Robinson says:—"On the completion of the dam the regulation of the flow of the Kennet would commence. The basis of that regulation would be the maintenance of a minimum flow of 300,000,000 gallons per day at Teddington Weir. Assuming the amount drawn from the Thames for water supply purposes at that time to be 130,000,000 gallons per day, it follows that the function of the Kennet Reservoir at the outset would be the maintenance of a minimum flow of 430,000,000 gallons per day, in the Thames above the water-works intakes. The storage necessary to accomplish this through the greatest droughts would be less than 10,000,000,000 gallons. The river Kennet, at its average rate of flow, would discharge this volume in ten weeks. If the reservoir sluices are closed for the first time at the beginning of November, and the discharge is regulated as stated, the reservoir would contain about 25,000,000,000 gallons at the beginning of June in the following year. If an extraordinary drought then occurred, the storage available would only be drawn upon to the extent of half or one-third. At the beginning of the second summer the reservoir would contain at least 35,000,000,000 gallons, and would probably be overflowing with 46,000,000,000 gallons stored. The outlet works consist of three tunnels in the London clay, each carrying a pipe 5 ft. in diameter, discharging into a large culvert, which would deliver into a gauging-basin provided with a weir constructed to measure the rate of discharge. The maintenance of a steady flow over Ted-

dington Weir all through the driest seasons would greatly improve the condition of the tidal part of the Thames. Between Reading and the waterworks intakes, the river would be improved to a still greater extent, as the flow would never be allowed to fall below 600,000,000 gallons per day after the reservoir had once been filled. This minimum compares with the 255,000,000 gallons per day already referred to as the minimum flow of the river recorded in August, 1887. It is clear that this increase would be of great advantage to tke mill-owners, the barge-owners, the riparian owners, and the pleasure-seekers."

The following table gives the capacities, areas, and water-levels of the three parts of the reservoir, viz., 1, the Main Kennet reservoir; 2, the Upper Kennet reservoir; 3, the Enborne Branch reservoir:—

	1.	2.	3.	Totals.
Total capacity, million gallons	38,240	5,826	2,586	46,652
Available storage capacity, million gallons	38,000	5,600	2,500	46,100
Area covered by water:—				
At overflow level, square miles	5·95	2 75	1 30	10
At outlet level, square miles	0 5	0·25	0·05	0·80
Overflow level above O D.	230	230	230	
Outlet level above O.D. ..	173	205	205	
Distance round shores, miles	11 5	7 33	11·2	

The areas that would be laid bare in the main reservoir by drawing off various volumes are as follows, the quantities being expressed in millions of gallons and square miles:—10,000—0·5; 20,000—1·0; 25,000—1·4; 30,000—2·15; 35,000—3·90. In an average year, only half a square mile would be laid bare out of an aggregate of 10 sq. miles of water, and this small area would be distributed over a length of 11½ miles of beach, giving an average width of under 230 ft. of beach laid bare. The excess of evaporation over the rainfall on the 10 sq. miles would be equal to about 2,600,000,000 gallons per annum, or about 5 per cent. of the average annual discharge of the Kennet. That had been stated to be 50,000,000 gallons, and it would be disposed of as follows:—

	Million Gallons.	
Evaporation	2,600	
Reading water supply.....	730	
Feeding the canal	1,100	
		4,430
Re-filling reservoir in an average year		10,000
Surplus		35,570
		50,000

In excessively dry years the total would be much less, and the deficiency is fully allowed for.

The cost of the scheme, with liberal allowances for compensation and cost of railway diversions, will not exceed 3,000,000*l.*, and the works could be carried out in three years.

Professor Robinson was examined at considerable length, particularly with reference to the efficacy of the puddle tunnels against leakage.

Mr. Binnie on the Proposed Reservoirs.

Mr. A. R. Binnie, Chief Engineer to the London County Council, being examined after Professor Robinson had propounded his scheme, was asked by the Chairman whether he expressed a general opinion against the formation of storage reservoirs in the valley of the Thames, and he said he did. His report was based on personal visits, and since writing the report he had made several journeys in the Thames Valley. He added that, when the Commission had before them detailed proposals for the construction of certain reservoirs, he hoped to be allowed to return and give his reasons for objecting to them.

The Chairman: We must consider that point. We do not open the door voluntarily to answer and re-answer if we can possibly avoid it. But do you carry your statement this length, that there is no possibility anywhere in the Thames Valley of making a storage reservoir?

Mr. Binnie: It practically amounts to that. There are one or two sites suggested on which a reservoir may be constructed at great risk and great expense.

The Chairman: Am I right that you commit yourself to the opinion that the thing itself is not physically possible?

Mr. Binnie: It is not, really.

The Chairman: You say that no storage reservoir of any kind can be made in any part of the Thames Valley or its tributaries?

Mr. Binnie: Not in connexion with the reservoir you have had placed before you by Professor Robinson. I do not see how it could be made, for this reason, that if you made it you would have every half-year a swamp receiving the drainage of Newbury and other towns, and also the water would be totally unfit for potable purposes.

The Chairman: That is a different point; but you seemed to say that the construction of the reservoir was not physically possible.

Mr. Binnie: I would not say that the making of that reservoir is physically impossible, but there are grave reasons for supposing that it could not be water-tight when it was made.

The Chairman: I do not want you to take that particular reservoir, but I want to know whether you adhere to the view that no reservoir can be made, and that that is your opinion as an engineer.

Mr. Binnie: I would not say that no individual reservoir could be made, but no series of reservoirs of sufficient extent to supply London could be made. Possibly here and there you could find a site for a small reservoir, but to build up a whole series of reservoirs such as would be requisite for the supply of London, it could not be done. There are nine reservoirs proposed; it has come to my knowledge unofficially; and I have visited the sites. Of the nine, seven, I say, could not be constructed at all, or if constructed they would not hold water. The remaining two could be constructed. One of them would be constructed at great risk and great expense, and possibly when finished it would not be water-tight. The other could be constructed and filled with water, but it would be a swamp and totally unfit for the purpose. I have been asked by members of the County Council to state in detail what I think of the suggested sites, and I have done so. I hope you will allow me to send in that statement when it is completed.

The Chairman: It would not be convenient that the statement you send in should be a criticism of the evidence that has already been given. In that case there would be both reply and counter reply, and the end of our inquiry would never be reached. When that further statement is ready we shall be glad to judge of it, but we must have it soon, or I am afraid it will be hopeless for us to undertake the examition of it.

A Scheme of Nine Storage Reservoirs.

Mr. Henry John Marten, C.E., and Mr. Henry Rofe, C.E., as advisers to the Conservators of the Thames, submitted to the Commission a plan for the construction of nine storage reservoirs. They took the daily quantity of water withdrawn from the Thames at 90,000,000 gallons, though it had reached 101,000,000 and 107,000,000, and the flow past Teddington at 234,000,000 down to 154,000,000 gallons, concluding that, with few exceptions, it might be taken as exceeding 200,000,000 gallons. The problem was to double the greatest abstraction, 107,000,000 without reducing the flow below 200,000,000 gallons. This increase would not be exhausted for forty or fifty years, or thirty-three if increase in every other source were excluded. In the search for suitable sites for reservoirs they had been assisted by Mr. Henry Woodward, F.R.S., F.G.S., and Mr. Horace B. Woodward, F.G.S., both experienced geologists, the latter possessing great local knowledge; also by Mr. Thomas Franklin, F.S.I., land agent to the proprietors of several large estates in the Thames basin above Oxford. From numerous suitable drainage areas they selected nine in the Upper Thames basin.

The following are the names or localities of the proposed reservoirs, with the geological character of (1) the drainage areas and (2) the reservoir sites:—

I. River Windrush, above Burford. 1. Great and inferior Oolite, overlying Lias Clays. Lias Clays exposed in valleys. 2. Almost entirely in Lower Lias Clay.

II. Sherborne stream, above junction with river Windrush. 1. Great and inferior Oolite, overlying the Upper Lias Clay. 2. Inferior Oolite overlying Upper Lias Clay.

III. River Cherwell, near Moreton Pinkney. 1. Oolites, Upper Lias Clay, and Marlstone, all exposed, with Lower Lias Clay below. 2. Marlstone overlying Lower Lias Clay.

IV.—Sor Brook, Broughton, near Banbury. 1. Mostly Marlstone overlying Lower Lias Clay which is exposed in valleys. 2. Lower Lias Clay, with Marlstone border.

V.—River Swere, near Adderbury. 1. Oolites, Marlstone, and Lias Clay. 2. Alluvial deposit overlying Marlstone and Lower Lias Clay.

VI.—Stream near Deddington.—1. Oolites, Upper Lias Clay, and Marlstone, with Lower Lias Clay in valley. 2. Lower Lias Clay.

VII.—River Dorne, near Woodstock, and

VIII.—River Glyme, above Woodstock. 1 and 2. Great Oolite overlying Upper Lias Clay.

IX.—Thame at Hardwick, near Aylesbury. 1. Mainly Kimmeridge Clay, with some Oxford Clay to north, a belt of Gault on east, and some Oolite on west. 2. Kimmeridge Clay.

The following table requires explanation. The drainage area of the Windrush is 43,776 acres, and is made 50,701 by adding 6,925 from the Sherborne stream, which by this deduction is reduced from 10,388 to 3,463. By the same process the capacity of the Sherborne is raised from 5,971 million gallons to 7,811. We preserve the numbers of the columns in the original table, the first being for the consecutive numbers used on the plans and the second for the names.

Storage Reservoirs Proposed by Messrs. Marten & Rofe.

—	3. Drainage Area.	4. Mean Annual Rainfall.	5. Estimate Available Rainfall.	6. Capacity of Reservoir.	7. Compensation to Streams.	8. Available for Supply.	9. Top Water Level Above O.D.	10. Top Water Area.	11. Height of Embankment.	12. Length of Embankment.	13. Cost, including Land.
	Acres.	Inches.	Inches.	Millions Gallons.	Gallon per Day.	Gallons per Day.	Feet.	Acres	Feet.	Yards.	£.
1. Windrush	50,701	32	11	7,811	9,950,000	53,268,000	420	1,454	54	1,220	633,000
2. Sherborne	3,463	31	10	600	2,146,000	Nil.	500	224	30	367	60,500
3. Cherwell	14,000	28	7	1,900	2,020,000	12,320,000	410	600	40	738	178,900
4. Sor Brook	22,176	30	9	3,024	4,120,000	19,940,000	335	730	50	558	236,025
5. Swere	13,196	30	9	1,800	2,450,000	11,870,000	310	500	45	578	160,250
6. Deddington ..	8,480	30	9	1,156	1,580,000	7,620,000	295	400	40	515	117,400
7. Dorne	10,000	30	9	1,364	1,860,000	9,000,000	330	230	40	570	120,400
8. Glyme	17,500	30	9	2,386	3,250,000	15,730,000	300	330	45	323	104,400
9. Thame	8,128	27	6½	1,108	1,090,000	6,640,000	290	500	30	808	162,150
	147,644			21,149	28,466,000	136,388,000					1,773,025

The headings of columns 7, 8, 9, and 11 require amplification as follows:—
7. Compensation to the streams, being one-third of the available rainfall for 365 days.
8. Available to augment the supply of the metropolis over and above compensation-water named in column 7, for four dry months, or, say, 120 days.
9. Level of the top water of the reservoir above Ordnance Datum.
11. Height of the embankment, 5 ft. above the top of the water.

The drainage areas, it is stated, are almost entirely of an agricultural character, consisting, according to returns supplied by the Board of Agriculture, of arable land to the extent of 56 per cent., and of pasture to the extent of 40 per cent. They are sparsely populated, having on the average only about one person to five acres. It has been a matter of considerable difficulty to arrive at the estimated available rainfall. The mean rainfall being estimated at from 25 in. to 27 in., 16 in. has been adopted as fairly representing the average loss by evaporation and absorption. One sixth has been deducted for the average of three consecutive dry years. The aggregate capacity of the reservoirs will be about 20,000 million gallons, or double that of Lake Vyrnwy reservoir, and the area will be double that of the lake with Lake Bala added to it. The puddle trenches can be sunk down to sound measures at reasonable depths. The works might be executed from time to time as they were required. No difficulty in construction is apprehended. All the sites are suitable, and where wing trenches may be found necessary they are indicated upon the sections. Flood water is greatly improved by storage in large reservoirs.

If the water were passed down the valley of the Thames in pipes the scheme would involve much greater cost; and it was proposed that all the water should be sent down the open channel of the river. This would tend to keep the water in the river in active movement during drought, and it would also benefit the navigation. The water would be aërated and oxidised in passing down the open channel and over and through thirty-eight weirs and water-wheels, with an aggregate fall of 184 ft. The sites for suitable reservoirs are by no means exhausted by these suggested.

Mr. Marten and Mr. Rofe were examined at considerable length in explanation of this scheme. Mr. Marten said that he was a member of the Council of the Royal Meteorological Society, a Fellow of the Geological Society, one of the three statutory arbitrators under the South Staffordshire Mines' Drainage Acts, Engineering Adviser to the Board of Agriculture, and Engineer to the Severn Commissioners, to the Staffordshire and Worcestershire Canal Company, and to other public bodies. In the exercise of his profession he had made waterworks in various parts of the country, by which nearly 750,000 people were being supplied with water. Mr. Rofe said that he had been continuously engaged in the construction of large storage reservoirs. He was at present carrying out large impounding reservoirs for the Corporations of Wakefield and Burnley, and for the Leeds and Liverpool Canal Company.

The Supplies from the Chalk.—Mr. Binnie on the London Wells.

Mr. A. R. Binnie, Chief Engineer to the London County Council, was recalled and examined with reference to the list of wells he had formerly handed in. An index map and six sheets of vertical sections were exhibited, and the sections were plotted to a common datum. The lists showed for each well the date of visit, the locality, the depth, the surface level above Ordnance Datum, the present water level above or below O.D., the past water levels above or below O.D., and the gain or loss of water; and historical and other remarks were added with reference to each. Mr. Binnie's report was as follows:—

"During the past few months the Engineer has had a careful inquiry instituted into the past history and the present condition of 172 wells situated either in or immediately outside the boundary of the County of London. Of course, this in no way includes the wells of the Water Works Companies, information respecting which was not at his disposal. Accompanying this statement is forwarded for the information of the Commission the detailed result of this examination in a schedule attached. To illustrate the position of these wells, an index map on a scale 6 in. to a mile has been prepared, on which are printed black figures corresponding with those in the general list. It will be found that there are more numbers on the index map than in the schedule, as certain wells could not be discovered on the ground, or information was refused; but as far as the numbers in the lists go they are perfectly coincident. It will be noticed that in the lists the wells are divided into three categories, (1) those on the north side of the Thames within the County of London, (2) those on the south side of the Thames within the County of London, and (3) those on the north and south sides of the Thames outside the County of London. Besides this list and the index map, six sheets of vertical sections of these wells also accompany this statement. On these sections are plotted to a common datum under their proper numbers detailed information of each well as given in the list. The collection of these data has been a somewhat laborious and tiresome process, and the Engineer would wish that he was able to give to the Commission further important information, viz., the yield of water in the wells under review; but unfortunately the owners of most of the wells which are in private hands, for reasons which will be readily understood, refused to give him this information, so that he is unable to state to the Commission what quantity of water is obtained from these wells. What at once strikes the eye in looking at these well sections is the fact that the water-level varies very considerably in all of them, not only at different times, but in contiguous wells at the same period; consequently it would appear that the whole mass of the chalk under London is not entirely saturated, as is often theoretically supposed, to one uniform and constant level, rising in a more or less steep gradient from the lower parts of the valley towards the point of outcrop of the chalk. Therefore it is a matter of some uncertainty at what level water may be struck in any proposed well, for it would seem that the water in the chalk is situated in or flows along fissures, so that well-sinking becomes more or less a matter of speculation; and when we notice that in the Index Table attached, that of the 172 wells 33 have been abandoned either through failure of supply or from other causes, we may conclude that, even when a supply is found, it is not always to be depended upon.

All these instances show a marked depression of the water-level in the chalk under London, which the Engineer considers to be a very important factor in dealing with this question. For if this depression exists it is difficult to understand how the water in the chalk area which lies in the Upper Colne Valley can flow to the south-east under London on its way to a discharge below the level of high-water in the Thames estuary. In fact, as it is well known that the chalk crops up in the bed of the Thames at or about Erith, the inference would rather be that a portion of the water of the Thames might, if a free course existed for it,

Summary of Results of Mr. Binnie's Inquiries into the Condition of Chalk Wells.

—	No. of Wells showing *Fall* of Water Level.	No. of Wells abandoned		No. of Wells where Information was not available.	No. of Wells showing little or no variation of Water Level.	No. of Wells showing a *Rise* of Water Level.	Total.
		Owing to failure of Supply.	Owing to causes not specified.				
WITHIN THE COUNTY OF LONDON.							
North of the Thames.	45	8	17	23	11	1	105
South do. do.	23	4	3	13	7	3	53
Total	68	12	20	36	18	4	158
OUTSIDE THE COUNTY OF LONDON.							
North of the Thames.	2	0	1	3	1	0	7
South do. do.	5	0	0	0	1	1	7
Total	7	0	1	3	2	1	14
Total visited, 172	75	12	21	39	20	5	172

NOTE.—The rise of water level is due in one case (No. 13) to reconstruction of well. In another (No. 117) it is due to consumption being greatly reduced. The remaining three, probably through imperfect lining, derive most of their water from the sand formation.

Of the twenty wells showing apparently little or no variation, one-half are cases in which no failure of supply is admitted, and no sufficient data for comparison can be obtained. The remainder are probably affected by the infiltration of sand or surface water, and are possibly in some cases influenced by the tide.

It is a matter of history that in the earlier portion of this century, when artesian wells were first put down in the London basin, the water flowed almost to the surface of the ground. It is now, however, depressed very much below that level, as will be seen by the many records in the schedule. If the index table is examined, it will be found that in thirty-nine out of the 172 cases, no information could be obtained; and consequently, for all practical purposes, we may base our calculations on the 133 wells of which information is more or less obtainable. Of these seventy-five, or 56 per cent., show a fall of water level; twenty, or 15 per cent., show little or no variation; thirty-three, or 25 per cent., have been abandoned either through failure of supply or from other causes; and in only five cases, or, say, 4 per cent., has there been a rise in the water level. But in these latter cases there are grave suspicions that the rise of water level is not due to the chalk-water itself, but to the infiltration of water from the sand areas, or to imperfect construction, or reconstruction. Notes of these will be found in the table. If we add together, therefore, the seventy-five wells which show a fall to the thirty-three which have been abandoned, we arrive at the fact, that in all probability at least 81 per cent. of the 133 wells either show an actual present fall of water or an entire exhaustion of supply. The general fall of the water level in the chalk, although it varies very much, may be taken at about 1 ft. per annum. There is a marked area of depression in the neighbourhood of the City of London on both sides of the river, where the water level, as shown in wells (among others) 25, 26, 33, 34, 35, 133, 134, 136, is depressed to about 100 ft. below Ordnance Datum, or 112½ ft. below Trinity high-water mark. From this point of depression the water level seems to rise, although in wells 73 and 75, at Chalk Farm and the Zoological Gardens, it appears to be depressed to 80 or 90 ft. below Datum; and at No. 77, at Webb's Mineral Water Works at Islington, it is 95 ft. below Ordnance Datum. No. 44, at Shoreditch Workhouse, is 87 ft. below Ordnance Datum. No. 68, at Messrs. Truman, Hanbury, & Co.'s Brewery in Spitalfields, it will be noticed that the water level is 239 ft. below Datum, and at St. George's Brewery, Whitechapel (No. 67), it is 171 ft. below Datum. The Royal Mint well (No. 24) is 98 ft. below Datum; and on the other side of the river we have the instance of Bethlehem Hospital well (No. 129) in which the water level has fallen considerably, and now stands at 126 ft. below Ordnance Datum.

flow down this gradient of 9 ft. per mile to supply the London wells. Certainly when we pass towards the east end of London and appoach the River Lea, the water-level rises, although at wells 57, 80, 81, and 82, it would appear to be between 40 ft. and 50 ft. below Ordnance Datum; but if the expectations of the Engineers of the Water Companies as to the possibility of obtaining much additional water from wells in the Lea Valley are well-founded, the condition of things existing in that valley shows an entirely different state of affairs to that found subsisting within a few miles to the westward. The Engineer is not aware, nor has he ever heard it suggested, that there is any great fault or dislocation running north and south up the Lea Valley, which would account for such a favourable anticipation. No doubt an additional quantity of water to that obtained by the East London and New River Companies from their existing wells may be anticipated in the future; but the Engineer, with the large experience of the past fifty years, which the map, sections, and details placed before the Commission have rendered available, would hesitate much before basing any exact calculations on the amount actually to be obtained from any wells in the Lea Valley. We may anticipate in that valley an exactly similar state of affairs to that found to exist in London. At first, and for a few years, if pumping is carried on to any large extent, the water will be obtained at the expense of the water-level in the chalk, so that the wells will have to be deepened and the pumps lowered, as has so often been the case in London wells.

But we cannot entirely put on one side the possibility that the lowering of the line of saturation in the chalk under London may be due, at all events to some extent, to the interception by the wells already used by the water companies of the chalk water which would otherwise flow in a direct southerly course from the outcrop of the chalk near Ware, to the deep-seated wells in the centre of the London basin. The Engineer can only make this as a suggestion, and as one of the possibilities which must be taken into account in reviewing the somewhat obscure and confusing state of affairs. The Engineer understands from evidence placed before the Commission that the East London Company anticipate a total possible 22,000,000 gallons a day which can be obtained from chalk wells, and the New River Company look to a like 23,500,000 gallons, making a total of 45,500,000 gallons a day at some future time. This, in another part of the evidence, he notes is stated as 44,000,000 gallons a day. The

Engineer is unacquainted with any case in which water is pumped to this amount for the supply of any town in any part of the world, from so limited an area, either in the chalk, the new red sandstone, or any other formation; and he feels certain that, if it be attempted on such a scale as this, the most disastrous results must arise in the upper parts of the valley, as he anticipates that almost all the existing sources of supply would be more or less dried up. There are two important factors that should be determined before the possibility of pumping this large quantity is admitted: (1) Some approximate idea of the velocity at which this large underground river is flowing, and (2) a clear demonstration that it breaks out at some point or points in anything approaching the volumes here spoken of. For it must be remembered that 44,000,000 gallons a day represents a stream of considerable dimensions, the flow of which, if it flow at all, should be capable of some exact demonstration. Nearly all the wells on the various sections, with the exception of No. 171 of the Richmond Water Works, are of the ordinary chalk type, going down for the purpose of obtaining water from that formation; but a few instances exist of attempts being made to obtain water from the greensand formation in the London Basin.

The Commission has already had placed before them an account of the failure of the Hampstead well of the New River Company. The Kentish Town well, an account of which, written by Mr. J. Prestwich, F.R.S., the Engineer will lay upon the table, has also turned out a failure; and the deep well at Richmond (No. 171) has not proved very successful, although sunk to a depth of 1,430 ft. below Ordnance Datum. The water level, after the pumps had been at rest for a fortnight, was about 133 ft. below Datum, and during pumping falls to about 213 ft. below Ordnance Datum. Attempts are now being made to improve the water-supply by connecting this well with a neighbouring chalk well, which is carried down to only 427 ft. below Ordnance Datum—that is to say, so poor is the supply derived from a well 1,430 ft. below Datum that it is about to be supplemented by a well 427 ft. below Datum, the 1,000 ft. of extra boring being sacrificed.

The late Metropolitan Board of Works sank two wells for the purpose of supplying their Crossness pumping-station. The depth of the older well was 944 ft. below Datum. The lower portion of this well had to be abandoned owing to an accident. The new well is 1,060 ft. below Datum, the bottom of the shaft being situated at 55 ft. below Datum. The water-level in this well stands at about 6·4 ft. below Ordnance Datum. A section of the well, with a report on the subject by Sir Joseph Bazalgette, will be handed in by the Engineer. From the old well about 20,000 gallons a day are obtained, and from the new well 40,000 gallons a day, but the water is not of good quality. From the chemical analyses attached to Sir Joseph Bazalgette's report, especially that of Dr. Odling, dated September 8, 1868, there are grave suspicions that all those deep wells which go down into the chalk in the neighbourhood of Erith have some subterranean connection with the river, as they give signs of containing an undue amount of common salt. From the experience gained from the Crossness wells and others near the river on its Kentish side below London, it would appear that no large quantity of chalk water flowing from the south towards the Thames Valley can be intercepted on its way to the supposed outfalls or springs in the bed of the Thames.

In 1878 the late Metropolitan Board of Works proposed to obtain a supplementary supply of water for London from chalk wells. The Engineer's predecessor, Sir Joseph Bazalgette, C.B., was assisted by the best engineers and geologists of the day, among whom may be mentioned Sir Frederick Bramwell, bart, F.R.S., W. Whitaker, F.R.S., and E. Easton, M.Inst.C.E. The result of their very careful investigation was that they discovered that they could only depend upon a quantity of about 30 million gallons a day in the vicinity of London."

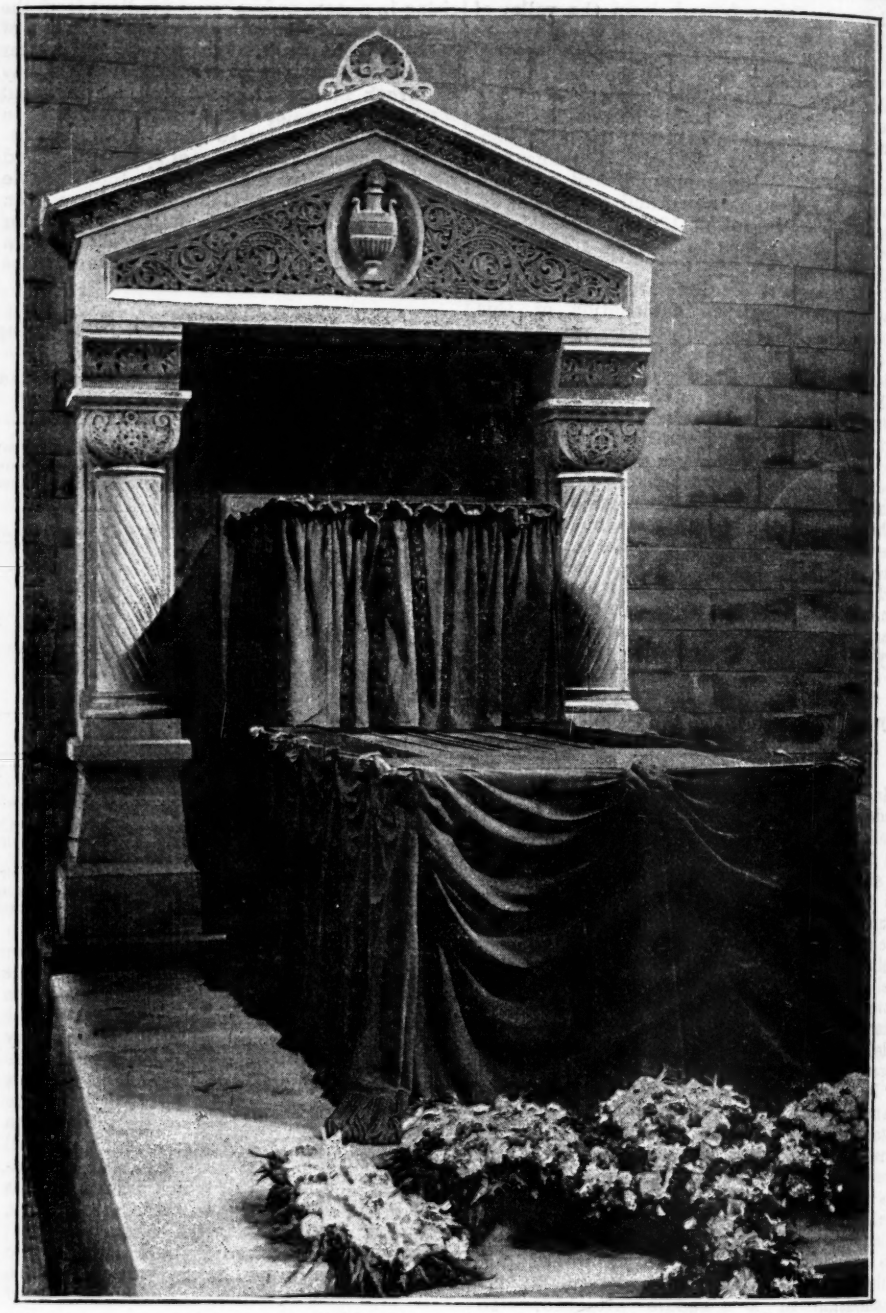
In reply to the Chairman, Mr. Binnie said the inference he drew was that well-sinking in the London area must always be more or less a matter of chance, and, secondly, that the water when met with flows in certain definite but undefined lines underground, either in fissures or in some other way. On the evidence he contended that there had been a general fall of about 1 ft. per annum since 1840 in the water-level in the chalk under London. The level of saturation was 52 ft. lower in some cases, and in others more. His general inference was that the available water in the immediate London basin of the chalk was becoming exhausted. This might possibly be due to the pumping of the companies, in the Lea Valley, for instance. Many owners of wells had been reluctant to give information as to the amount of water they had taken, as they had a fear lest it should be divulged, and they felt they were drawing from a common source. He disagreed with Mr. Baldwin Latham as to the additional water to be had from this source. If you pumped more water from the wells you might dry up the upper streams which go into the river in dry weather.

To Mr. Hill: His opinion as to the amount of water available from the chalk was necessarily very vague, as anybody's must be.

To Professor Dewar: He was dealing with a circle six miles in diameter, and a radius of three miles from the centre of London. The whole depression could hardly be caused by the pumping of breweries, because it extended over a large area and to so great a depth. The suggestion that the water might be taken by the pumping in the Lea Valley involved the assumption of an underground conduit.

We hold over for want of space this week a report of evidence given by Sir F. Bramwell and Professor Robinson on the subject of supplies from the chalk; and the immediate interest attaching to definite proposals for the construction of storage reservoirs compels us to pass over for the present the more general, although practical and important evidence of Mr. Baldwin Latham, Mr. Peregrine Birch, and other witnesses.

The Commission held a sitting on Wednesday last, when the following geologists were on the list of witnesses:—Mr. W. Topley, Mr. A. B. Woodward, Mr. R. Etheridge, Professor W. Boyd Dawkins, and Dr. H. Woodward.



Manchester Crematorium: Canopy of Bier-Stand. *See p. 321.*

Illustrations.

DESIGN FOR A CHAPTER-HOUSE.

THIS is the perspective view of the design to which the Institute of Architects awarded the Soane medallion this year, the author being Mr. Heber Rimmer, of Chester. The drawing was hung in the Architectural Room of the last Royal Academy Exhibition. The author says:—"In this design an elevated site was supposed, and an open cloister carried round the chapter-house in order that the Dean and Chapter, or Abbot and Monk as the case stands, may have the advantage reserved to themselves of the prospect such a sight might command.

It has been objected by a monthly magazine that the 'windows' in this cloister are too large for their purpose. Is such a thing possible in a stone-faced cloister in cloudy England? These traceried openings would not, of course, be glazed.

The usual central shaft was not in this case adopted, as I am assured by a President of an

English chapter that in a fully-attended meeting it is a great objection, on the same principle, of course, that a similar shaft in any other modern debating-house or court would not be tolerated."

COMPETITION DESIGN FOR GLASGOW ART GALLERIES.

THIS design was made to suit the requirements of the first set of conditions in the recent competition for the Glasgow Art Galleries. It comprises central hall, museum, and picture gallery, also an art school. The plan is so arranged that the entire building could be thrown *en suite* on any special occasion, with the music hall as the central feature. The picture galleries are on the ground-floor, and the public would have direct access to them from the street,—being one story in height they are entirely top-lighted. The galleries having no exhibition rooms underneath them, are rendered absolutely fire-proof.

The central hall was designed with special regard to acoustics, and to give as imposing and grand an effect as possible. It has a semi-circular vault or ceiling springing from the clearstory windows, and was to be constructed of iron and concrete, faced with plaster decoration and mosaics. The central lantern would be supported on large iron-framed girders, taking the form of the hall ceiling, and resting on massive stone piers, shown on plan. The circular portion would be constructed of iron and concrete, faced with terra-cotta, and the flèche on top of teak wood. The two other cupolas give light to staircases. The museum galleries and top-lighted courts are placed right and left of the central hall, and it was proposed to protect and screen the skylights from external view with ornamental balustrades of terra-cotta work, which would harmonise with the Italian red tiles suggested for the roof. The roof would all be of iron construction, filled in with concrete, and the base of the building up to the level of the ground-floor windows was to be of grey granite. The whole of the external walls above the base would be faced with pink coloured terra-cotta, and the cove under the roof tiles would be constructed of concrete and iron, and entirely faced with coloured mosaics with white as a background. The design, with the omission of the school of art block, was estimated to cost 150,000*l*.

TOWER, ST. MARY'S CHURCH, LYNTON.

THE original church, which consists of the south aisle and its west tower, dates from the fourteenth century, but there were very few traces of the old building when the late restoration was put in hand.

The nave and north aisle were of a bastard Egyptian design, and have been entirely rebuilt in the local manner, with wrought-stone arcades and barrel roofs with moulded ribs and carved bosses.

The fine fourteenth-century roof was stripped of the plaster put on about a century ago and opened out and repaired. A portion only of the whole scheme has been at present carried out. The chancel, vestries, morning chapel, and tower now illustrated are yet to be completed. The north porch is elaborately carved and panelled. A figure of the Virgin and Holy Child, now being carved by Mr. F. W. Pomeroy, will occupy the central niche. The builders were Messrs. Bryant & Son, of Barnstaple, and the architects the late Mr. John D. Sedding and Mr. H. Wilson.

The drawing of the tower, by Mr. Wilson, was hung in the Royal Academy Exhibition of this year.

NEW CREMATORIUM, MANCHESTER.

WE give an exterior and interior view, and plan, of the new Crematorium for Manchester, built from the designs of Messrs. Salomons & Steinthal of that city, and which was announced to be opened on Friday of this week by the Duke of Westminster, on the occasion of the third annual meeting of the Manchester Crematorium Company, to be held in the hall of the building.

The walls of the building are faced both outside and inside with terra cotta, of a golden-buff tone outside and a creamy-buff inside. The platform on which the bier stands is in Hopton Wood stone, and the canopy is executed in Bath stone.

The arrangement of niches inside the hall in one of the bays is carried out in red sandstone, with white Sicilian marble slabs forming the front of the niches, and intended to receive the inscription. The remaining bays, both inside and outside, under the arcading on either side of the hall, will be filled up as required.

We give also a cut showing the design of the canopy behind the platform for the bier.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of this Council was held on Tuesday afternoon last, at Spring-gardens, the Chairman, Mr. John Hutton, presiding.

Tenders.—Tenders were received for the erection of an isolation ward, &c., at the infirmary of Feltham Industrial School. We publish the list in another column.

Blackwall Tunnel Approaches: Working-class Dwellings.—The consideration of the report and recommendations of the Bridges Committee on this question was resumed. Owing to the importance of the subject, and with the view of enabling our readers to clearly appreciate the points of the discussion, we reprint from last week's *Builder* the following four paragraphs of our report of the Council meeting of Tuesday week:—

"The Council has referred to us [the Bridges Committee] several tenders for the erection of the artisans' dwellings on the Yabsley-street site.* On further consideration we think that it would be more economical if the Council were to erect the buildings; by so doing it would save the extra cost which would be represented by the contractor's profit, and also the expense of supervising the work. The Council, moreover, could rely upon having the best materials and workmanship, and at the same price that would be charged in the first instance to contractors. We therefore recommend—

'That the Council do erect the artisans' dwellings to be constructed in connexion with the Blackwall Tunnel scheme without the intervention of a contractor, and that the Bridges Committee be authorised to take the necessary steps for carrying out this recommendation.'"

On the presentation of the report Sir Thomas Farrar asked the following among other questions of the Chairman of the Committee, viz.: 1. Whether the amount of the lowest tender for these buildings was 11,386*l*., and whether the amount of the next lowest tender was 14,168*l*.? 2. What was the amount of the Architect's estimate? 3. Why did not the Committee recommend the acceptance of the lowest tender? 4. Whether the Committee had considered how the work could be superintended if it were undertaken by the Council itself?

To these questions Mr. Grosvenor, the Chairman of the Committee, replied as follows:—1. Yes. 2. 10,800*l*. 3. Because the Committee had reason to apprehend that the tender would be withdrawn, and it had, in fact, since been withdrawn. 4. The Committee had not considered the question of arranging for superintendence; it would be time enough to do that when the Council had decided that it would do the work itself.

Mr. McCall on Tuesday last moved the following amendment:—

"That the matter be referred back to the Committee with instructions to report to the Council which of the tenders referred to the Committee on September 27 is the most advantageous to the Council; or, if they are of opinion that neither of the tenders received should be accepted, it be an instruction to the Committee to re-advertise for tenders."

He complained of the scanty and meagre information furnished in the Committee's report. He was willing to believe that the Committee had endeavoured to the best of their ability to count the cost before making their recommendation, but the reasons put forward by them were utterly fallacious. If the recommendation of the Committee were adopted it would prove to be a most costly one for the Council and for the ratepayers. It was said that the Council would save the contractor's profit. He denied that that would be the case. Not satisfied with that, the Committee went on to make the further statement that they would save the cost of supervision! Why, if they dispensed with the contractor, with his keen personal interest and his intelligent supervision, they must have some one else in his place possessing a thorough knowledge of the work to be carried out. Men possessing such qualification would want a very high salary for their services. Which of these methods of supervision was likely to prove the most economical and efficient? A contractor had a keen personal interest in the proper performance of the work, and looked well after it, as he was obliged to do to make it pay in these times when profits were reduced to a minimum. On the other hand, if the Council did its own work, and supervised it by officials to whom it did not matter whether it cost more or less, the expenditure upon it would tend to increase. It was said that the Council would be able to buy its materials as cheaply as contractors could buy them. He entirely demurred to that statement, and said that the large builders, with a thorough knowledge of their business, would be able to buy at least 5 per cent. cheaper than the Council. Then there was the question of plant and machinery. For every building that it undertook the Council must incur a large outlay for plant and machinery, which would have to be sold at less than half-price when the work was finished. That was a matter in which a contractor would have a great advantage over the Council, for he would keep his plant and machinery as part of his stock-in-trade. Another and perhaps still more formidable objection was that if they superseded the contractor and took the work into their own hands they might find themselves in conflict and collision with the working classes on such questions as rates of wages and hours of labour. The Council had very usefully intervened with the view of seeing that men employed by contractors on the work of the Council were fairly remunerated and were not kept at work for too many hours, and the contractors themselves were beginning to recognise the justice of that policy, although for some other reason they seemed to be fighting shy of the Council and its contracts. He thought that the Council could afford to adopt a conciliatory policy towards the contractors; at any rate, it would be useless to attempt to set them at defiance. The contractors were great organisers of labour, and were skilled in the art of building, and the true policy of the Council would be to adopt a conciliatory policy towards them, especially in view of the public buildings and improvements which the Council would have to carry out in the near future, and which he ventured to affirm could not be carried out without the intervention of contractors.

Mr. Holmes seconded the motion, on the ground that the Council was an administrative authority, and not a body which should enter into building speculations. He urged the Council to profit by the fate of its predecessors, the Metropolitan Board of Works, who ventured into land speculations which eventually culminated in acts of jobbery which resulted in the disestablishment of the Board. Surely it was not for the Council to step forward and close the ordinary avenues of trade by competing with builders and becoming building speculators! To do that would, in his judgment, be to take a very false step. By all means let them have their work done well; but that could be achieved by seeing that they had proper conditions in their contracts, and that those conditions were properly carried out. It was not the place of the Council to turn builder and contractor, and it would not succeed if it attempted to do so. The Council had to pay regard to the welfare of the ratepayers as a whole, and not to the wishes of a few. The institution of a Building Committee or Works Department within the Council might place within the hands of the members of the Council some amount of patronage to bestow amongst their friends, but such a thing would not be for the public welfare, and he therefore hoped that the delusive notion of the Committee would be rejected.

Mr. Arthur Arnold said that while he had no objection to the principle that the Council should undertake their own work when they were sure they could do it better than contractors, he was unable to support either the report or the amendment. He thought the report deficient in information, and therefore misleading. They were told that this plan would save the contractor's profit and the cost of supervision, but nothing was said about the important matter of plant. Work of this sort would require costly plant, and he thought the proposal should be further considered in a more practical and businesslike manner.

Mr. Benn, M.P., objected to anything that would shelve the question, and urged that the principle suggested should have a fair trial. They were determined not to be placed at the mercy of contractors, and he contended that they could do the work for themselves as well and as cheaply as it could be done outside. He hoped to see a Works Committee established, and said they should look upon themselves as directors of a large company whose

* For list of these tenders see *Builder*, Oct. 1, p. 271.

duty was to secure large dividends and fair wages. A Works Committee would promote healthy competition.

Mr. John Burns, M.P., said he had consistently advocated the formation of a Building Department or a Committee of Works. He entirely agreed that these operations should be carried out on business lines, but they were all of opinion that it was desirable to eliminate the middleman. It was said that contractors would leave the Council severely alone if they did their own work, but he had letters in his hand in which two large firms offered to tender for their masonry at fixed rates. Not only would they give generous terms, but they would be glad of the work, for they would be sure of being paid. Returns showed that twenty per cent. of the builders of London became bankrupt, to the loss of the merchants and specialists, who, in order to recoup themselves, spread that loss over other work, and made other people, including the Council, pay for it. As to the plant, he contended that they had already a large stock, and more than half enough to build the proposed dwellings at Blackwall. The Committee did not expect to save all the cost of supervision, but they would certainly save the contractor's profit. He reminded the Council that in four important contracts they had paid 8,106*l.* 6s. 11d. for supervision, and this would have been more than sufficient to pay foremen, managers, and superintendents in their own employ for looking after the work. In another case 498*l.* had been saved on a job of 1,315*l.* by the Council carrying out the work themselves. Was that extravagant? At Wandsworth-common the Parks and Open Spaces Committee expended 3,000*l.* in labour, and he would guarantee that no contractor would have undertaken the work for less than 6,000*l.* All through, the experience of the committees who did their own work was the same, that a great saving was effected. They got the work better done, and incidentally improved the condition of the workers, besides relieving the rates. Generally speaking, the Council's officers were not in favour of the proposal, being under the impression that it would increase their work and responsibility, but he thought he could assure them that this would not be the case. London would be only following the example of Leeds, Bradford, Manchester, Liverpool, and other places, and even in London the Vestries were beginning to do their own work instead of letting it out to contractors. The large railway companies were adopting the same principle, and in every way the middle-man was being eliminated where possible. They wanted to get rid of sub-contracting and labour disputes, and to place the whole thing upon a fair and satisfactory footing.

Sir J. Lubbock, M.P., said he could not support the proposal of the Committee. If they were to adopt the course proposed they would entirely lose the benefit of healthy and stimulating competition. It was quite a mistake to suppose that they could do away with supervision, even if they did the work themselves. He maintained that experience had shown that municipalities and governments could not advantageously undertake to do everything, for if they did they were apt to lose the power of control. The Council had quite enough to tax their time, energies, and abilities, without going into building operations; and because the proposal would, in his opinion, tend to increase rates and discourage private enterprise he felt bound to oppose it.

Mr. Henderson said that the opposition to the Committee's report came from the same quarter as the opposition to the trade union and labour policy of the Council. They were told that they must not interfere with private enterprise; but he held that they were there to look after public convenience and interests, and not to safeguard private privileges as in the past. The Council had already undertaken a good deal of their own work, and the result was most satisfactory. The majority of the Council had pledged themselves at the election to eliminate the contractor, and now was the opportunity for carrying out their promises.

Mr. R. Roberts pointed out that the recommendation of the Committee was not a new departure, as they had employed their own labour for a considerable time. Undoubtedly there was great friction between the Council and contractors, whereas if they worked for themselves they would have proper control over the whole thing. Building was an experiment in direct employment which was not especially difficult, and it was more likely to be a success than a failure. Of course they must have a proper organisation before the Council could do this work, and they must pay properly for skilled supervision. The friction between capital and labour was so intense that they were bound to attempt some solution of the problem, and this would be a beginning. As a builder, he was bound to say that much of the public work done by contract was by no means good.

Colonel Hughes, M.P., supported the adoption of the Committee's recommendation, and said the London School Board had afforded them an object-lesson in the necessity of doing their own work. He did not hesitate to try the experiment, and he had no doubt that they would succeed.

Mr. Sidney Webb said they must not fly in the face of science and economy, both of which pointed in the direction of doing their own work. He considered the Committee amply justified in making the recommendation they did, and he said that no political economist could be found who would now support the doctrine of employing the middleman, and the Council could well do without him. Nearly all colonial railways were now made and maintained by the Government, who saved the exorbitant profit of the contractor by employing their own labour.

After some further discussion, Mr. McCall's amendment was rejected, on a division, by 83 votes to 30.

Mr. Beachcroft moved a further amendment referring it to the General Purposes Committee to consider and report as to the desirability, in the interests of the ratepayers, of the Council undertaking the execution of such works without the intervention of the contractor, and of organising the staff that such a course involved.

Mr. Æneas Smith seconded this amendment, and pleaded that meanwhile work might be given to responsible contractors, so that the many men unemployed in London might have a chance of being engaged.

Ultimately the amendment was withdrawn.

On behalf of the General Purposes Committee, Mr. J. W. Benn, M.P., moved, and Mr. John Burns, M.P., seconded, the following amendment:—

"That all the words after the word 'contractor' be omitted, and that the following be substituted,—' and that the General Purposes Committee be instructed to consider and report on the best manner in which works can in future be carried out, and to make proposals as to the necessary organisation and staff.'"

This amendment was carried without a division.

Sir John Lubbock, M.P., then moved to amend Mr. Benn's amendment, by leaving out the words after "report on the" in order to insert "whole question, and if they are of opinion that such works can be advantageously carried out by the Council in future, as to the best system under which this can be done."

Mr. Arthur Arnold seconded the amendment.

On a division the amendment was lost by 74 to 37, and the recommendation of the Committee, as amended by Mr. Benn's amendment, was then agreed to.

The Proposed Street from Holborn to the Strand.—The Parliamentary Committee presented a long report on this subject, but its consideration was adjourned until next week.

After discussing other matters the Council adjourned at a quarter past seven o'clock.

COMPETITIONS.

Infectious Hospital, Keighley.—Thirty sets of drawings were sent in in this competition, and the plans submitted under motto "Isolation" No. 2, by Messrs. Judson & Moore, architects, Keighley, were, as we announced in the *Builder* for October 8 (p. 284), approved and accepted. We now learn that the first premium has been awarded to the plans under motto "Progress," by Messrs. Marshall & Dick, of Newcastle-on-Tyne, and the second premium to the design submitted by Mr. W. de Lacy Aherne, C.E., Birmingham, under motto "Ab Wortha."

Mechanics' Institute, Ripon.—The plans of Mr. G. Styan, St. Helen's Chambers, York, have been accepted for a new Mechanics' Institute, Ripon. The plans provide for committee-rooms, reading-room, billiard-room, library, schoolroom, and lecture-hall, with rooms for the caretaker, and, in the yard, rooms for cookery classes, workshop, &c.

THE INCORPORATED ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

The fourteenth Voluntary Pass Examination of candidates for the offices of Municipal Engineer and Local Board Surveyor, carried out by this Association, was held at the Yorkshire College, Leeds, on Friday and Saturday, September 30 and October 1.

The Examiners were:—1. In Engineering as applied to Municipal Work, Mr. E. Pritchard, M.Inst.C.E. (Past President); 2. In Building Construction, Mr. W. Geo. Laws, M.Inst.C.E. (Past President); 3. Sanitary Science, Mr. A. M. Fowler, M.Inst.C.E.; and 4, Public Health Law, Mr. Joseph Lobley, M.Inst.C.E. (Past President).

The following seven gentlemen presented themselves for examination, all of whom satisfied the Examiners, and the Council have granted them the Association's certificate, viz.: Messrs. Gilbert T. Bassett (Birmingham), Joseph P. Greenwood (Barry), Oscar Hellawell (Withington), George W. Lacey (Kettering), Thomas H. N. Parr (Walsall), Thomas L. Perkins (Bristol), and John A. Wright (Bristol).

The next examination will be held in London in April next.

Correspondence.

To the Editor of The Builder.

"ART AND ARCHITECTURE IN TENNYSON'S POETRY."

Sir,—In your last week's leader on the *motifs* for decorative art to be found in the poems of the late Lord Tennyson you omit,—in an otherwise exhaustive category,—the Idyll of "Gareth and Lynette," which contains much word-painting capable of being transferred to stone or canvas.

The description of "the wondrous gate of misty fairy Camelot" seems especially capable of being thus developed,—indeed, I once attempted such development in my salad days, and no doubt produced a somewhat wild design, with figures probably out of drawing, which has long since past with many another youthful scheme into the *Ewigkeit*. But what would Burges not have made of the following?—

"And there was no gate like it under heaven:
For barefoot on the keystone, which was lined
And rippled like an ever-fleeting wave,
The Lady of the Lake stood: all her dress
Wept from her sides as water flowing away;
But, like the Cross, her great and goodly arms
Stretch'd under all the cornice and upheld:
And drops of water fell from either hand;
And down from one a sword was hung, from one
A censer, either worn with wind and storm;
And o'er her breast floated the sacred fish;
And in the space to left of her, and right,
Were Arthur's wars in weird devices done,
New things and old co-twisted, as if Time
Were nothing, so inveterately, that men
Were giddy gazing there; and over all
High on the top were those three Queens, the friends
Of Arthur, who should help him at his need."

What wonder that to the imagination of Sir Gareth's meaner companions it seemed to move in all its twisted phantasy, and that

"they call'd
To Gareth, 'Lord, the gateway is alive?'"

Percy G. Stone.

*** We are obliged to Mr. Stone for calling attention to a fine passage of design which we had overlooked. To say truth, we have never been very fond of the later Idylls, which appear to us very inferior in balance and artistic finish to the first four, and still more to the "Morte d'Arthur," the precursor of them all.—Ed.

THE INSTITUTE AND ARCHITECTURE.

Sir,—As the interesting correspondence under the above heading seems to be concluded, may I reply to one or two references to my original letter?

My friend Mr. Blashill has very fairly stated the several points at issue, and which seemed to me opportune to discuss when the Institute has under consideration the qualification of its "Fellows." As he rightly points out, the Charter at present stamps the Institute as a professional society willing to admit any one who "has been trained in a satisfactory way for the practice of the profession," and is otherwise "honest" and decently "civil." It was no doubt framed to admit

every class of practitioner in the several departments of professional work. There surely can be no objection to this? Indeed I have personally advocated an extension of its memberships, on the ground that the several crafts in connexion with building should be represented, and that distinguished painters and sculptors should be included amongst its Hon. Fellows, but this was determined to be contrary to the Charter.

It is an anomaly that specialists in any branch should be labelled as Architects and Fellows, and our contention is that in an Institute of *Architects*, the Fellows, at least, should consist only of those who practise architecture.

This should be no disparagement to the honourable and more remunerative profession of Surveyor.

The formation of any club or group of men *inside* the borders of the Institute would inevitably degenerate into a clique which in time might prove dangerous to other interests. As the Institute is at present constituted, there is nothing for those who claim for architecture its high prerogative, and who desire to see the Institute advance with the times, but to recognise the fact hinted at by Mr. Blashill that "*their sphere of usefulness appears to be outside its walls.*"

I am not concerned at present to defend the position of those who advocate the recognition of architecture as an "Art."

As you, sir, assert in your admirable article, the scientific element cannot be abrogated without loss to its special claim to respect; and, as you rightly suppose, I in no way intended to omit "Construction," which I suppose to be the science, as you cannot have the art of architecture without the science of construction.

We are awaiting with interest the statement of views held by Mr. Norman Shaw and Mr. T. E. Jackson and of the architects who are not now members of the Institute, which I see advertised in your last issue as about to be published. They will, no doubt, rectify some mistaken notions on the whole subject, and serve to assist the Institute in coming to the conclusion that the charter, if it stops the way of advancement in sympathy with artistic progress, must be revised.

JOHN BELCHER.

SIR,—I have just read Mr. John Belcher's wise and conciliatory letter in the *Builder* of September 3. Being now far removed from the controversial civil war that was raging between architects when I left England, I have had the opportunity of unbiassed reflection on the subject, and I think that Mr. Belcher goes to the root of the matter, and proposes a compromise which offers the best solution of the difficulty. Let the Institute alter the name of the examination for membership; if too much is not claimed for it, opposition will disappear, and it will gain the importance and popularity which it well deserves. And let them pursue the same policy with regard to the fellowship, and make the title a distinction awarded to a few. No one, then, as seems often the case now, will be ashamed to add the letters to their names, and the title will be honoured over the whole world.

The faults of the old system at the Institute, before the days of the examination and the necessity for an immediate and wise reform, are conspicuously seen in this colony. The architecture of the Dutch, as seen in what little remains of old Cape Town and in the farmhouses of Constantia and the wine-growing districts of the neighbouring mountain valleys, is extremely picturesque and well-suited to the climate and materials of the country. Ruthless destruction, however, is now going on, and cement and iron erections, covered with the most ignorant efforts at "ornament," are converting Cape Town, built on a site which has been compared to that of Naples, into one of the most dismal cities of the world. Yet it is possible for these destroyers of the fair face of nature, if they have done it on a large scale, to add the magic letters of the Institute to their names, and an F.R.I.B.A. may boast of the demolition of old houses entrusted to his care. Bad architecture is, perhaps, inevitable in a new colony, but it is for the Institute to consider how far it is wise for them to lend, as it were, a sanction to it.

HERBERT BAKER.

Cape Town.

VESTRIES AND HOUSE DRAINAGE AND DISTRICT SURVEYORS' DRAINAGE.

SIR,—I was very disappointed on reading your last two issues to find no further correspondence on these subjects. A few more letters like Mr. Bernard Dicksee's should be of the greatest interest and value to your readers. With respect to the Camberwell regulations, their prohibition of the use of iron pipe is only on a par with their specifying (?) breeze concrete for the bedding of stoneware pipes, 9 in. by 6 in. pipe where 4 in. should be, terminal ends of ventilating pipes discharging close to windows, fresh-air inlets at least 75 per cent. too small, &c.

If a District Surveyor's drainage is truly represented by "Notanda's" sketch, I should say that a worse planned job could scarcely be possible; it can only be described as an unventilated, inaccessible, horizontal cesspool. The "trap" is one of the most obsolete, and certainly, as constructed, in a dangerous position, and big enough for a town, and the water-flush from the w.c. would have absolutely no scouring effect, it would simply dribble through a channel which it would wear away for itself in the gradually accumulating soil, &c.

As Mr. Dicksee says, the County Council should take the matter in hand, and, after their regulations have been framed, properly-qualified Inspectors should be appointed to carry out and maintain them. It seems to me also that our present day Sanitary Inspectors' work should be modified, the inspection of food, &c., should be apart from the sanitary inspection of houses.

J. KEMSLEY, R.P.C., &c.

The Engineering Exchange, E.C.

"IS THE PROFESSIONAL ASSESSOR A FAILURE?"

SIR,—In reference to the Accrington Technical School Competition, the question might be asked, Who drew up the instructions concerning it?

That they should be prepared by one who has some knowledge of the cost of work is, I think, indispensably essential, but if you would be so good as to look at the enclosed instructions issued in this instance, you will at once see that either this could not have been the case, or else the Accrington Technical Instruction Committee wanted an exceedingly good money's worth.

I also beg to enclose a copy of the type-written sheet that accompanied my drawings.

A COMPETITOR.

*** The accommodation demanded for 6,000*l.* (including supply of gas and water pipes, and heating apparatus) is simply absurd, and so our correspondent appears to have plainly intimated in sending in his design.—ED.

The Student's Column.

CONCRETE.—XVII.

PROPORTIONS OF INGREDIENTS, &c.

THE specification of the proportion of the various ingredients in concrete is frequently ill-considered and indefinite. We often see specifications in which concrete is required to be composed of Portland cement, sand, and broken stone in the proportion of 1 of cement to 8 of the other materials, but nothing whatever is said as to whether the sand and broken stone are to be measured separately or not; or, the ingredients, perhaps, must be Portland cement, sand, and gravel, proportioned as before, and nothing is said as to whether the sand forming part of the gravel has to be screened from it so that the sand and gravel can be accurately measured. It may be thought that this is a detail of little importance; it is, let us say, of great importance. In the mixture of Portland cement, sand, and broken stone mentioned above, it would be to the contractor's interest to measure the sand and broken stone together in a box having eight times the capacity of the box in which the cement was measured. He would find that the large box, when filled to the top with broken stone, would contain 30 or 40 per cent. of voids between the stones, and it would be a great saving to him to fill these voids with sand, so that the concrete would really consist of 1 part of cement, and (say) 3 parts of sand, and 8 parts of broken stone, or a proportion of 1 to 11 if the ingredients are taken separately. It needs no great insight to see that a 1 to 8 mixture, in which the proportions are 1 cement, $1\frac{1}{2}$ (or 2) sand, and $6\frac{1}{2}$ (or 6) broken stone, will be stronger than the 1 to 8 mixture described above. But when gravel is used, there is an added uncertainty; for gravels contain variable quantities of sand, and unless the quantity in the particular gravel specified be ascertained, or, better still, be entirely eliminated, the strength of the resultant concrete cannot be foretold with any approximation to accuracy. Ordinary gravel may contain from 30 per cent. to 50 per cent. of its volume of sand. Two concretes specified to be of 1 part Portland cement and 8 parts gravel, may prove considerably different in strength. If the gravel contain only 30 per cent. of sand, the mortar in the concrete consists of 1 part of cement to 2·4 parts of sand; if the gravel contain 50 per cent. of sand, the mortar consists of 1 cement to 4 sand. The former mortar will be 50 per cent. stronger than the latter, and experiments have shown that the transverse strength of concrete varies very nearly, other things being equal, as the strength of the mortar in which the coarse ingredients are embedded.

Two series of most interesting experiments, demonstrating the truth of this statement, were carried out by Mr. Darnton Hutton, at the Amsterdam Canal Harbour Works in 1872 and 1878.* The tests were made because the concrete blocks were not as hard and strong as they ought to have been, and Mr. Hutton came to the conclusion that "where the sand was very fine, the less sand that was used the better."

The first series of tests was made with 1 to 9 concretes containing various proportions of Portland cement, shingle, and sand. Taking the transverse strength (at three months) of a mixture of 1 Portland cement + 4 sand + 5 shingle to be 100, we find the strength of a mixture of 1 + 3 + 6 to be 121, of 1 + 2 + 7 to be 225, of 1 + 1 + 8 to be 285, and of 1 + 0 + 9 to be no less than 334.

The second series of tests was made with concretes containing uniformly 1 part of cement and 5 parts of shingle, but various quantities of sand. Taking the transverse strength (at four and a-half months) of a mixture of 1 Portland cement + 4 sand + 5 shingle to be 100 as before, we find the strength of a mixture of 1 + 3 + 5 to be 113, of 1 + 2 + 5 to be 184, of 1 + 1 + 5 to be 289, and of 1 + 0 + 5 to be no less than 361.

A comparison of the ratios existing between the various concretes in the two series reveals the fact that the strength depends almost wholly on the quantity of sand mixed with the cement, and not on the amount of coarse material. In other words, the strength of concrete varies, within certain limits, according to the strength of the mortar, in which the aggregate is imbedded. It must be noticed that this is true within certain limits only, for, although little difference is noticeable in the strength of sandless concrete, whether it contains 9 parts of shingle or only 5, yet, if the proportion of shingle be increased beyond 9 parts, the limit will soon be reached at which the neat cement becomes too small in bulk to form a film between all contiguous surfaces of the shingle, and these dry joints are, of course, a source of weakness.

Concrete, however, is seldom used in large masses, with a matrix of neat cement, partly because of the cost of such concrete, but also because of its porosity and the greater care required in its manipulation. In Mr. Hutton's experiments, the blocks without sand were full of holes outside, and not by any means homogeneous inside; those containing only one part of sand were also honeycombed, although not to as great an extent as the foregoing. The "shingle," it must be said, was not "absolutely free from sand."

Fig. 2 (Chapter XI.) shows graphically the strength of different mortars at different ages. Roughly speaking, it may be said that the strength of Portland cement mortar 1 to 1 is $\frac{3}{4}$ that of the neat cement, 1 to 2 is $\frac{1}{2}$, 1 to 3 is $\frac{1}{3}$, and 1 to 4 rather over $\frac{1}{4}$. Beyond this, the ratio gives results much too low, but the rule is correct enough within the limits named, and no one would think of using concrete with any greater proportion of sand to cement than 4 to 1. Indeed, a much smaller proportion of sand is invariably used nowadays. It is false economy to use too much sand.

The importance of this point is now so well-known that many engineers consider that Portland cement concrete should never have a weaker mortar than 1 to 2, and some even object to use a mortar weaker than 1 to $1\frac{1}{2}$. But different proportions of sand are required for different purposes; where strength is required the least possible quantity of sand should be used; when imperviousness to water is required, a greater quantity of sand is necessary.

Voids in Aggregate.—The object usually aimed at in proportioning the ingredients of concrete is to obtain an aggregate containing the least possible quantity of voids or interstices, and to add to this sufficient mortar to fill these voids with about 10 per cent. in addition, to allow for the mortar joints and for imperfect mixing. The method of ascertaining the voids in any aggregate is simple:—Fill a watertight box of known capacity with damp

* See "The Proceedings of the Institution of Civil Engineers," vol. lxii, 1879-80, part iv.

aggregate, shaking it well during the operation; then pour into the box sufficient water to fill it to the brim; the quantity of water is the measure of the voids in the aggregate. The voids in the sand can be ascertained in a similar way. Another method is to weigh a certain quantity (say, 1 cubic foot) of the broken material and compare it with the weight of a similar quantity of the same material unbroken. The difference in weight gives the amount of voids in the broken material.

It will sometimes happen that the voids in the aggregate are so large that the filling of them entails either a very weak mortar or an extravagant amount of cement. In such cases, the aggregate is at fault, and the fault will as a rule be that the aggregate is of too uniform a size. The least quantity of voids will be found in those aggregates which contain pieces of various sizes, and machine-broken material usually fulfils this condition better than hand-broken.

It is impossible to state definitely what will be the voids in various aggregates. So much depends on the shape and size of the pieces. Good gravel and shingle, screened free from sand, contain about 33 per cent. of voids; broken stone of uniform size may contain 50 per cent. If the gravel consist of small pieces it may be mixed with broken stone of larger dimensions, and the voids in the mixture need not exceed those in the gravel, although the voids in the broken stone alone might do so to a considerable extent. In this way Lieut.-Col. Gillmore obtained an aggregate (free from sand) containing only 23 per cent. of voids. Ordinary limestone was crushed by a Blake's stone-breaker into pieces of all sizes below 2-in. cubes and of various shapes; and gravel was obtained from the sea-shore, consisting, after the sand had been screened out, of pieces varying from the size of a pea to that of a hen's egg. He found that the least amount of voids occurred in those mixtures which contained 15 measures of gravel and from 11 to 15 measures of broken stone. The worst mixture (15 to 27) contained only 30 per cent. of voids.

This is a vast improvement on the voids mentioned above for broken stone of uniform size. Solid concrete made from the latter would be 20 to 30 per cent. weaker than that made from the former, while the cost of the two would be practically the same.

Mortar.—In calculating the amount of mortar required to fill the interstices in any aggregate, due allowance must be made for the voids in the sand itself, and for the skrinkage in both the sand and the cement when these are mixed with water. Roughly speaking, the bulk of cement is, according to Mr. Sandeman, reduced 10 per cent., and of sand 20 per cent., by mixing with water.

Gillmore found that neat Portland cement shrank about 16 per cent. on being mixed with water, and that cement and sand (1 to 1) produced a quantity of mortar about 30 per cent. less in bulk than the two ingredients measured separately; other mixtures (1 to 2, 1 to 3, and 1 to 4) shrank about 23 per cent. in mixing and making into mortar.

With ordinary aggregate consisting of fragments of various shapes and sizes, and containing about 33 per cent. of voids, the following mixtures would produce solid concrete:—

TABLE XXI.

Proportion of dry ingredients (in volumes) to produce solid concrete.

Portland cement.....	1	1	1	1	1	1
Sand	1	1½	2	2½	3	3½
Broken material.....	3	4	5	6	7	8

But as we have already shown, solid concrete does not necessarily offer a greater resistance to tensile or transverse stress than does porous concrete; resistance to these stresses depends rather on the strength of the mortar, provided always that there is enough mortar to coat the whole surface of every fragment of aggregate, so that the pieces shall always have a film of mortar between them.

Where impervious concrete is required, it is necessary not only that the voids in the aggregate be completely filled by the mortar, but also that the voids in the sand be completely filled by the cement. To allow for imperfect mixing and for the coat of mortar between the fragments of the aggregate, an excess of mortar equal to at least 10 per cent. of the voids in the aggregate must be used, and to allow for the film of cement coating each grain of sand, an excess of cement equal to 10 per cent. of the voids of the sand must be used. The sand also may contain finer grains than would be the case if strength and not imperviousness were aimed at.

Quantity of Concrete Produced.—We have seen that sand and cement shrink in bulk on being made into mortar. In the same way, when cement, sand, and aggregate are mixed together, the bulk of concrete produced is less than the bulk of the several ingredients. The amount of shrinkage varies according to the voids in the materials, according to their wetness when measured, according to the proportion in which the materials are mixed, and according to the amount of ramming to which they are subjected. If the aggregate contain little voids, and the sand and cement be about 10 per cent. in excess of these voids, the measure of the aggregate may be taken as the measure of the finished concrete. Frequently, however, the finished concrete measures even less than the aggregate, because the latter contains an amount of voids in excess of the mortar, and these voids are to a great extent eliminated by ramming. Where an excess of sand is used, the finished concrete will measure more than the aggregate. No hard-and-fast rule can be laid down as to the amount of concrete which will be produced by different materials. Moist Thames ballast, when made into concrete with lime or cement, but without further admixture of sand, appears to shrink from 0 to 10 per cent. If the materials are dry when measured, the shrinkage may reach 15 or more per cent.

OBITUARY.

The late Mr. James Fowler, F.R.I.B.A., of Louth.—To the brief mention made by us last week (p. 306) of the death of this well-known and able architect, we now add the following particulars, which we glean from a long notice which appeared in the *Louth and North Lincolnshire Advertiser* for the 15th inst.:—Mr. James Fowler was born in the year 1828, and was educated at the Diocesan School, Lichfield. He was articled to the late Mr. Joseph Potter of that city, architect, and while with him he executed some of the lithographic plates for his work on "Buildwas and Tintern Abbeys." Afterwards he assisted Messrs. Bowman & Crowther, of Manchester, with their large and important work on the "Churches of the Middle Ages," and Mr. J. S. Padley, of Lincoln, with his book on "The Ancient Monastic, Ecclesiastical, and Domestic Edifices of Lincolnshire." In 1849 he came to Louth, and was engaged on some work for the county justices in the then prison, which was situate in Eastgage, at the corner of Ramsgate, and during this time he measured up the tower and spire of the parish church, a work of some magnitude, the spire being nearly 300 ft. high, and considered one of the finest church spires in the kingdom. In 1851 Mr. Fowler commenced practice in Louth In conjunction with Mr. Joseph Maughan (recently deceased), and during this partnership carried out some engineering works in the enclosure of lands on the Lincolnshire coast at Northcotes, and the building of the sea-sluice at Saltfleet Haven, &c., with other works. This partnership was terminated in 1859, since which time Mr. Fowler has carried on the profession of an architect only. He was elected a Fellow of the Institute in 1865, and for four years sat on the Council, three in succession, during the presidency of Mr. T. H. Wyatt. Many important churches have been designed by him. Amongst them may be mentioned St. Mary's, Lichfield (the Bishop Lonsdale Memorial); St. Swithin's and St. Andrew's in Lincoln, the former with a fine tower and spire, 200 ft. high; the parish church of St. Mary, Newington, London, which was described by the late Sir Gilbert Scott as "one of the finest modern churches in London"; Holy Trinity, Wanstead, Essex; St. Matthew's, Skegness, SS. Mary and Gabriel, Binbrook. St. Michael's Church, Louth, was built by Mr. Fowler in 1863 at a cost of about 3,000*l.* Also must be included the interesting and important restoration of the historical church of Bolingbroke, formerly the chapel of the Castle, while to this list may be added the chancel, &c., of Heckington Church; the restoration of Tathwell Church; Leverton, Frieston Priory, Bennington, and many others in Lincolnshire; Balderton, Hawton, West Retford, Nuttall, and others in Nottinghamshire; and his work extended further, and may be seen in Yorkshire, Hampshire, Suffolk, Surrey, and other counties. Among Alderman Fowler's works near at home may be named the rebuilding of Domus Dei, or Brownes' Hospital, Stamford. Mr. Fowler also built Langton Hall, Dalby Hall, Cadwell Hall, Morton Hall, Notts, Dingley Hall, Weelsby House, and many parsonage houses in Lincolnshire and adjoining counties. He also erected a large number of business premises, &c., including several banking establishments for Messrs. Garfit & Co., Lincoln and Lindsey Banking Company, &c.——The following is a list of Mr. Fowler's works which have been illustrated in the *Builder*, viz., King Edward VI.'s Grammar School and Bede Houses, Louth, Jan. 30, 1869; Church of St. Mary, Newington, April 10, 1875; interior, Church of St. Guthlac, Market Deeping, Dec. 6, 1879; exterior and interior views of St. Clement's Church, Skegness, April 3, 1880; Chancel of St. Swithin's Church, Lincoln, Nov. 27, 1880; interior of Holy Trinity Church, Gedney Hill, Lincolnshire, July 22, 1882; reredos, St. Mary's, Newington, April 14, 1883; The "Orme" Bede Houses, Louth, March 5, 1887; interior, SS. Peter and Paul, Bolingbroke, Lincolnshire, July 13, 1889; and chancel, Church of St. Andrew, Heckington, Aug. 17, 1889. We understand that Mr. Fowler's practice will be carried on by his son, Mr. Reginald H. Fowler.

GENERAL BUILDING NEWS.

New Church, Jersey.—The new Church of St. Aubin's, Jersey, built on a plot of ground adjoining the site of the edifice which it replaces, is fast approaching completion. The church is built entirely of granite, the exterior walling being of pink Mont Mado granite with dressings of grey Perruque granite; the quoins from the old chapel were here used when found suitable. The interior is plastered, with pink Mont Mado columns, arches, and general dressings. Its external length is about 100 ft., and the width 70 ft.; the internal length 94 ft., and the width 41 ft. The roofs are trussed open timber, of fir, boarded inside, and covered on the outside with Broseley tiles. That portion of the flooring under the seats is composed of wooden blocks on concrete, while the passages and chancel are of coloured tiles in patterns. The building consists of nave, aisles, chancel, chancel aisle, organ-chamber, and vestry. A tower and spire will ultimately be built at the southern corner. The nave consists of five bays, moulded, with clearstory windows overhead. The chancel-arch is lofty and richly moulded, as also are the side chancel-arches. The windows throughout are of granite tracery. The church is lit by gas pendants. There are five arches with four pillars on either side of the body of the church, with four large windows and ten smaller ones to the north and south. These do not include the large windows at the eastern and western ends of the church, nor those near the altar. The church will seat 340 people, the seats throughout being of oak. There is a reredos of alabaster with bronze shield bearing emblems of the Evangelists and the sacred monograms, which has been executed by Mr. H. T. Margetson, of Chelsea. A brass cross, with five agates, is placed on the shelf of the reredos. Carved oak altar-rails, with figures of the Twelve Apostles in canopies, are being made, but will not be in position for one or two months. A carved oak eagle lectern has been presented by Mrs. Braithwaite. The two west windows of the aisles contain painted glass in memory of Mr. Philip Marett, the chosen subject being the parable of the Good Samaritan. Another painted window is in memory of the Rev. W. Power Cobbe. These windows are the work of Messrs. Heaton, Butler, & Bayne, of London. The remainder of the glazing is of tinted rolled cathedral glass leaded in patterns. The style of architecture is Early English. The church and all the fittings were designed by, and carried out under, the superintendence of the architects, Messrs. J. E. K. & J. P. Cutts, of London. The contractors were Messrs. Woodsford & Harris and Mr. T. Blampied, while Mr. J. Laurens acted as clerk of the works.

New Business Premises in Holloway-road.—An extensive block of new buildings in Holloway-road, erected for Messrs. Jones Bros., and constituting, with the older premises of the same firm, a kind of North London "Whiteley's," was opened for business on Thursday last, the 20th inst. The new buildings occupy a frontage of about 112 ft., and run back for a depth of about 80 ft. They are six stories in height, the three lower stories being devoted to business purposes, while the three upper stories (which are separated from the business premises by a floor of fireproof construction) are fitted up for the accommodation of the *employés* of the firm. The superficial area of the basement is about 9,000 ft.; the ground floor has the same area, and the first floor an area of 8,000 ft., making a total of about 26,000 superficial feet devoted to purposes of sale and show rooms. Between the new premises and the old ones runs a narrow turning leading to the stables and electric light works of the establishment, but the new and old premises are connected by means of a subway on the basement level and by a bridge at the level of the first floor. The *façade* is a free treatment of Renaissance work. The general mass of the building rises to the height of 60 ft. above the pavement, the tower rising to a height of 100 ft. This tower, which at the present time forms the south end of the new block, will become the central feature of the building when the premises are extended to the corner of Loraine-road. Some play of light and shade is obtained by the introduction of large bay and oriel windows, and the skyline is broken by dormers. The materials used in the *façade* are buff-coloured malm bricks, with white stone dressings. Under the tower is the principal

entrance, 16 ft. wide and 26 ft. high. The architects of the new building are Messrs. Davis & Emanuel, the surveyors being Messrs. Young & Brown; and the building work has been carried out by Messrs. Colls & Sons, of Camberwell, under the general supervision of Mr. Elliott. Messrs. Dennett & Ingle executed the constructional ironwork, Messrs. F. Sage & Co. the shop fronts and fittings, and Messrs. Sharp & Kent the electric light wiring and fittings.

Public Library, Ayr.—The memorial stone of the Carnegie Public Library, Ayr, was laid on the 5th inst. by Mrs. Carnegie. The library was designed by Mr. Campbell Douglas, of the firm of Messrs. Campbell Douglas & Morrison, Glasgow. Built of Ballochmyle stone, in the Renaissance style, and situated on the north side of the river, nearly opposite the New Bridge, it contains a lending department, a general reading-room, provided with seats for 103 readers, a reference department, a ladies' reading-room, and a museum.

St. Barnabas Church, Liverpool.—The spire of St. Barnabas Church, Parliament-street, Liverpool, being in a dangerous condition, is now being taken down by Mr. E. Burns, contractor, under the direction of Mr. T. C. Ebdy, 30, North John-street, the architect to the trustees. The whole church is shortly to come down, and the stone and materials will be used in building a church in the Anfield district, to accommodate about 700 persons.

New Church, Newport, Monmouthshire.—On the 26th ult. the new Church of St. Matthew, Barnardtown, Maindee, Newport, was dedicated. The building has been erected by Mr. Charles Lock from designs prepared by Messrs. Graham, Son, & Hitchcox, and is in the Gothic style. The roof is of open timber and match board, covered with slates. The building will seat 512 persons. The internal walls are stuccoed, and the woodwork is stained and varnished. There is a transept on either side, and a choir vestry and organ-chamber.

Branch Bank, Aston Cross, Birmingham.—On the 27th ult. a new building was opened at Aston Cross by the Birmingham District and Counties Banking Company for the business of their Aston branch. The premises comprise a banking-room, private-room, strong-room, and a residence for the sub-manager. The building has a frontage of 35 ft., and is three stories in height. The front is of Ruabon red bricks, with dressings of Hollington stone to the lower story, and of terra-cotta to the upper portion, the latter being of buff and light red tints. The builders are Messrs. James Smith & Sons. New fittings have been made by Mr. David Lloyd, of Aston. The whole has been designed and superintended by the architect, Mr. C. Whitwell.

Restoration of Dunblane Cathedral.—On the 6th inst. the memorial-stone commemorating the restoration of Dunblane Cathedral was laid by the Grand Master Mason of Scotland, the Earl of Haddington. The work of restoration has occupied three years. The work has cost 26,000*l.* The architect is Dr. Rowand Anderson, of Edinburgh.

Wesleyan Chapel, Elland, Yorkshire.—A new Wesleyan chapel was opened at Elland on the 4th inst. by Dr. Stephenson. The chapel takes the place of the old one in Eastgate, on a larger site, the new church having a frontage to the Huddersfield-road. It is in the Renaissance style. The estimated cost is between 6,000*l.* and 7,000*l.* There is sitting accommodation for 750. Mr. Waddington, of Burnley, was the architect.

Congregational Chapel, Newton Heath.—On the 8th inst. the memorial-stone of a new Congregational chapel in Newton Heath was laid by Mr. Samuel Lamb. The new building is situated off Thorpe-road, Newton Heath, with a frontage to Jessie-street. It will be mainly a brick structure, Runcorn sandstone in conjunction with Accrington red bricks being used. Accommodation will be provided for about 330. The architect for the work is Mr. S. Fell, of Manchester, and the builders, Messrs. Moore & Son, Eccles.

New Church, Hamstead, Staffordshire.—The new church of St. Paul, Hamstead, situated at the junction of the new and old roads from Birmingham to Walsall, and erected in the Early Decorated style, was consecrated on the 29th ult. by the Bishop of Lichfield. The edifice, which consists of nave, north and south transepts and aisles, chancel, and choir and clergy vestries, is built of red brick, with Bath stone dressing; the roof is constructed of pitch-pine, and covered with tiles, and a bell-flèche rises at the east end. Inside the church the nave measures 67 ft. 6 in. by 20 ft., the aisles are 10 ft. wide, while the chancel is 27 ft. 6 in. in length, and has a width of 20 ft. On either side the transepts project 3 ft. to 4 ft. from the aisles. The organ-chamber is arranged to the north of the chancel, and on the south is the choir and clergy vestry. The entire cost of the building, which has been erected by Mr. J. Harley, of Smethwick, is estimated at about 3,400*l.*, and there is chair-seating accommodation for about 450 persons. The church has been erected from the designs of Mr. William Davis, architect, of Birmingham. That gentleman was seized with a serious illness when the building was only partially erected, and the work has been carried out under the direction of Mr. William Hale, architect, of Birmingham.

SANITARY AND ENGINEERING NEWS.

The Registration of Plumbers in Scotland.—The District Council for Perth, Forfar, and Fife met on Saturday, the 15th inst., in the Town-hall, Dundee. Ex-Bailie Ogilvie, Vice-President, occupied the chair. The minutes of the Congress Committee showed that the thanks of the Council had been tendered to the various public authorities of Dundee, Perth, and St. Andrews for their assistance in furtherance of the objects of the late Congress of District Councils of Scotland. On the question of transferring Dunfermline from this District to the Edinburgh District, a feeling was expressed that it was undesirable to alter the existing arrangements until after the passing of the Plumbers' Registration Bill. The Chairman presented to Mr. W. E. Grimwood, of Montrose, a certificate bearing the seal of the Worshipful Company of Plumbers, London, in recognition of his having passed the examination in the preliminary course of the Company's Graded Syllabus of Instruction for Plumbers. It was mentioned that this was the first certificate of the kind granted to a Scottish student. Mr. J. L. Warden agreed to again hold the Plumbing Class at Montrose, for which and for past services he and Mr. J. Wood were accorded a hearty vote of thanks. Applications for registration were read and referred to the Registration Committee.

Wirksworth Sewerage Scheme.—At a special meeting of the Wirksworth Local Board on the 12th inst., one of the two sewerage schemes submitted to the Board in May last was finally adopted. The scheme adopted is that of Mr. T. S. McCallum, of Manchester. Mr. McCallum proposes to adopt the international system of purification by means of ferozone and polarite.

Burton-upon-Trent Sewerage.—The Town Council of Burton-upon-Trent at their last meeting decided to carry out a scheme for the re-sewering of the town area. The sewage question in Burton is, as is well known, one of great difficulty, owing to the peculiarity of the industry of the place, and the fact that the greater portion of the town is extremely flat. The character of the sewage is such as to render it quite unique as to its composition and physical properties. It is often of high temperature, and very offensive, its volume (often 6,000,000 gallons per day for a town having a population of about 50,000), and the large proportion of solids it contains, all tend to render its treatment one of very exceptional difficulty. The scheme now adopted by the Corporation, prepared Mr. J. E. Swindlehurst, C.E., the Borough Engineer, is for the reconstruction of the sewers throughout the greater portion of the Borough. The estimated cost of the scheme is about 40,000*l.* It is intended to supplement this by the construction of works for the treatment of the sewage and sewage sludge before it is delivered on to the sewage farm.

FOREIGN AND COLONIAL.

France.—M. Bunel, Chief Architect of the Préfecture de Police, who has been commissioned to make a preparatory study of the project for the rebuilding of the Opéra Comique on the old site, has just finished his report, which concludes by approving (with a few modifications in detail) of the plans submitted by the Ministère des Beaux-Arts to the superior Commission on Theatres, which is to meet in a few days.——The Gobelins collection, which already comprises several thousands of reproductions of tapestries, has been still further increased by a new series of portraits of the painters who have worked for the manufactory.——M. Roger Ballu, Inspector of Fine-Arts, son of the eminent architect of the Hôtel de Ville, has just been chosen principal Commissioner of Artistic Exhibitions in France and abroad. He has been succeeded in his duties by M. Armand Silvestre, well known for his novels and art criticism.——A rich Greek banker, M. Schilizzi, has commissioned M. Vaudremer to build a Greek church, which is to be situated at the angle of the Rue Bizet and the Rue Pierre Charron. The church will be solemnly inaugurated next June. The total cost, including the price of the ground, is estimated at 1.500,000 f., all contributed by M. Schilizzi.——M. Paul Delaire, Commissioner of Exhibitions, has lately been nominated keeper of the Sculpture Museum of the Trocadéro, in place of M. Geoffroy Dechaume, who has recently died.——There is some talk of erecting a monument to Emile Augier, the celebrated dramatic poet, in the Palais Royal garden. Augier has been dead about three years.——A committee has been formed to erect a monument at Denain in commemoration of the victory gained by the Maréchal de Villars before this town in 1712. The sculptural portion of the monument is to be executed by M. Henri Gauquié, the pedestal by M. Dutouquet, architect.——The Minister of Public Works has conferred on one of the chief engineers of Ponts et Chaussées the mission of studying both in France and abroad the advantages, from an industrial and technical point of view, of the rack-wheel railway, over the ordinary railway which is now in operation in mountainous regions.——The Delphic excavations were inaugurated on October 7, in presence of M. Homolle, Director of the French School of Archæology at Athens.——The Minister of Public Instruction and Fine Arts has lately been to Tours and Nantes for the purpose of inaugurating in the former place the statues of Mirabeau and Rabelais, and in the latter, the new Lycée, which is an important building.——The jury on the open competition for a Museum of Painting and Sculpture at Nantes has just given its judgment. The first prize has been awarded to M. Josso (Clément Marie), architect at Paris, who will execute the work; the other prizes have been given as follows:—2. MM. Arfvidson (André), and Antoine (Joseph), architects at Paris. 3. M. Huguet (Eugène), architect at Lyons. 4. M. Blavette (Victor), architect at Paris; and honourable mention to MM. Louvet, Bréasson, and Conil-Lacoste.——A monument has lately been inaugurated in a village in the Department of Maine-et-Loire to the memory of the Gaul warrior "Dumnacus," chief of the Andes. The sculptural portion of the monument is by M. L. Bonnemère.——A discovery has lately been made at Toul (Meurthe and Moselle) in the choir of the cathedral, of a tomb hidden in an excavation, and ornamented with an artistic statue of a bishop. It is supposed that this tomb, which is in a rather bad state, was that of Henry De Ville, Bishop of Toul in 1425.——A metal tower, resembling the Eiffel Tower, is to be erected at Lyons on the heights of Gay de Fourvière.——On Thursday last, October 20, a monument was erected in the little town of Morlocas (Basses Pyrenées) to the memory of Doctor Depaul, late President of the Academy of Medicine in Paris. This monument consists of a bronze bust executed by the sculptor, Albert Bartholomé, placed on a pedestal of red sandstone, executed by M. Leidenfrost, architect of the Chateau de Pau, from designs by M. Frantz Jourdain, a Paris architect.——The first stone of the "Palais des Consuls" was laid last week at Rouen.——The sculptor, Alfred Boucher, has just finished his model of the statue of Theophraste Renaudot.——The death is announced, at the age of sixty-nine, of M. André Cheviron, honorary trustee of roads in the Ville de Paris.——We have also learnt the death of M. Eugène Rigault, late second Prix de Rome, architect of the Pharmaceutical School, who made under the Minister of Postes and Telegraphs, some remarkable works for the installation of the new telegraph service. M. Rigault was only fifty-one.——M. Pierre Pécaud, architect at St. Nazaire, has just died at the age of fifty-three. He was a pupil of Questel, and built several edifices in Brittany, the depôt for the custom-house, the Palais de Justice, several private houses, and the "Grand Hotel" of the town. He was an active member of the Central Society of Architects since 1881.

Norway.—A new church has been added to the public buildings of Christiania. It stands on the so-called Jrüner Lökke, and has been designed by the city architect, Herr Bull.——Two new churches have been completed on the west coast of Norway, viz., at Kalvaag and Store Kalsö, the architect of both being Herr H. Jess, of Bergen. The former is Mediæval in style, and built of grey granite; the latter, also Mediæval, but built of timber.——Several important marble deposits have been discovered near Bodö, on the north-west coast; whilst at Fredrikstad a marble-polishing factory has been established.——An interesting find of Viking arms has been made near Sandefjord, on the Christiania fjord.

MISCELLANEOUS.

The Surveyors' Institution.—The first ordinary general meeting of this Institution for the session 1892-93 is fixed to be held on Monday, November 14, when the President, Mr. Charles J. Shoppee, will deliver an opening address. The chair will be taken at eight o'clock.

Bradford Historical and Antiquarian Society.—The annual meeting of this society was held on Tuesday evening in the Alexandra Hotel. The chair was taken by Mr. T. T. Empsall, the President. The annual report was read by Mr. J. A. Clapham, the hon. cor. sec., who congratulated the members upon the flourishing condition of the society, which now numbers 236 members. Papers were to be given during the coming session by Dr. Leadman, F.S.A., Wm. Scruton, C. A. Federer, T. T. Empsall, John Sowden, and John Lister, M.A., upon a variety of interesting subjects; and during the summer it was proposed to visit Kirkstall, Adel, Otley, Leathley, Grassington, Settle and Giggleswick, Middleham, Bolton, Wensley, Leyburn, Thornton, Shuttleworth, and Leventhorpe, under able guidance.

Recognition of a Surveyor's Services.—The Wandsworth Local Committee of the Board of Works for the Wandsworth District have submitted the following resolution to the Board, viz., "That the Committee desire to place upon record their appreciation of the able manner in which Mr. J. C. Radford, the Surveyor for Putney, has carried out the additional duties of Acting Surveyor for Wandsworth, and recommend that he be paid 300*l.* therefor (being salary at the rate of 450*l.* per annum for six months and an additional 75*l.* as a special recognition of his services)."

Removal.—Messrs. F. Whitfield & Co., announce their removal from 66, Holborn Viaduct to 20, Cheapside.

CONTRACTS.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Roadmaking Works	Lewisham Bd. of Wks.	*Official*	Oct. 25
Street-making and Paving	Wallasey Local Board	A. Salmon	do.
Police Station, Keith, N.B.	....	F. D. Robertson	do.
Sewering, Paving, &c. Old Trafford, Manchester	.. ..	John Bowden	do.
Sewer, Wyndham-lane	Plymouth Corp.	G. D. Bellamy	do.
Paving, Flagging, &c.	do.	do.	do.
Stoneware Pipe Sewer	Totnes U.R.S.A.	C. G. S. Acock	do.
Waiting-rooms, Additions, &c. Maidenhead Station	G. W. R. Co.	*Official*	Oct. 26
Extensive Sewerage Works	Cardiff Corporation ..	W. Harpur	do.
*Iron Roof Principals for Baths	Coventry Baths Com.	H. J. Burgess	do.
Farmhouse, &c. near Harbertonford, Totnes, Devon	H. P. Skidmore	.....	Oct. 27
Chimney Stack, Portwood Works	Stockport Corp.	S. Meunier	do.
Retort Mouthpieces, &c.	do.	do.	do.
*Painting, &c. Works	Islington Guardians..	W. Smith	do.
*Making-up Roads	Walthamstow Loc. Bd.	G. W. Holmes	Oct. 28
Chemical Laboratory and Lecture Room Fittings, &c. Southampton	Hartley Institution ..	W. B. G. Bennett	Oct. 29
*Pipe Sewers	Torquay Local Board	H. A. Garrett	Oct. 31
Road Metal, Cattedown, Plymouth	Compton Giffard Loc. Board	*Official*	do.
*Sewerage Works	Godalming Main Sewerage Board	H. Moon	do.
*Roadmaking Works	Islington Vestry	*Official*	do.
*Making-up Roads	Tottenham Local Bd.	J. E. Worth	Nov. 1
Concrete Sea Wall	Torquay Local Board	H. A. Garrett	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Four Dwelling-houses, Llanbradach, Caerphilly	Ll. Llewellyn	.....	Nov. 1
Wrought-iron Covered Footbridge, Chester	L. & N. W. Ry. Co. ..	*Official*	do.
School Buildings and Caretaker's House, Carlisle-street	Sheffield School Board	J. E. Benton	Nov. 2
*Library, Willesden Green	Public Libraries Com.	Newman & Newman..	do.
*Library, Harlesden	do.	J. Cash	do.
Four Semi-detached Villas, Heath Estate, Halifax	.....	Horsfall & Williams ..	Nov. 3
*Street Works	Sevenoaks Local Bd...	Jabez Mann	Nov. 4
Sewerage Works, Deri	Merthyr Tydfil U.R.S.A	James Jones	do.
Shop and Offices, High-street, Elgin, N.B.	.....	John Milne	Nov. 5
Iron Roof	Sheffield United Gas Co.	F. W. Stevenson	Nov. 7
*New School Buildings and Alterations ..	Aldershot School Bd.	S. Stapley	do.
School Buildings, Tylsaf Field	Ystradyfodwg Sch. Bd.	J. Rees	do.
*Underground Convenience	Paddington Vestry ..	*Official*	Nov. 14
*Head Master's House	Governors of Seckford Hospital and Woodbridge School	F. Chancellor	Nov. 17
*200 tons of Broken Granite	Borough of Ryde (I. of W.)	*Official*	No date
Cottage and Shop, Dufftown, N.B.	J. J. Hay	.....	do.
Six Houses, Armley, Leeds	Edwin Wright	.....	do.
Four Terrace Houses, Garforth, Leeds	.....	Morley & Woodhouse	do.
Offices, Cookery School, House, &c. Parkroad	West Hartlepool Sch. Board	John Clayton	do.

Those marked with an Asterisk (*) are advertised in this Number. *Contracts, pp.* iv., vi., *&* viii.

LONDON PROPERTIES FOR SALE.—Three notable properties are offered for sale, by private treaty or, that failing, at auction, and in each case by order of mortgagees. They are the Salisbury estate, Strand; Hyde Park Court, Knightsbridge, both freehold; and Whitehall Court, Victoria Embankment, held on lease from the Crown. The first-named consists of the area lying between the Savoy Hotel and Adam-street, with part of the land which formerly abutted upon the Thames, the freehold of which was bought from the Marquis of Salisbury a few years ago by Messrs. J. W. Hobbs & Co., Limited. On this site has been erected, after the designs of Messrs. Perry & Reed, architects, the large hotel, now partially completed, and of which we published a view on October 20, 1888, together with two plans and a section of the proposed buildings in their entirety. Here a sum of 150,000*l.* has already been spent; and it is calculated that upon carrying out the original plans, a rent of nearly 50,000*l.* will be returned. We gave a short history of this site in a "Note" on December 10, 1887. Hyde Park Court, a vast pile on the west side of Albert Gate, was intended for a residential hotel, and was built by Messrs. J. W. Hobbs & Co., Limited, contractors, from the designs of Messrs. Archer & Green. The site, being about 28,400 ft. superficial, was leased for ninety years at 7,000*l.* per annum, with option to take the freehold at twenty-two years' purchase. An aggregate revenue of 27,000*l.* is expected to accrue from the several rents. The west wing is in course of completion for the Hyde Park Club. Of Whitehall Court,—Messrs. Archer & Green, architects,—we published an illustration, with description, on January 2, 1886. The complete designs provide for 101 suites of flats, yielding an estimated rental of about 35,000*l.* a year. The building is in three blocks, of which the north and centre blocks are finished and, in part, occupied. A reference to the plan in our columns of December 5, 1885, will show that Whitehall Court, the Avenue, and the road which is being made from the Embankment to the cleared site of Lord Carrington's house, designed, reputedly, by Sir William Chambers,* occupy the ground which was covered by Whitehall Palace, and in later years by the Almonry Royal and Queen's Treasury, the Palace Beer Buttery, and by Fife House and Little Fife House, with their riverside gardens.

DISSOLUTION OF PARTNERSHIP.—We are informed that the partnership between Mr. G. H. Brougham Glasier and Mr. Henry J. Dowden, under the firm of Glasier & Sons, of Spring-gardens, surveyors, land agents, and auctioneers, having ceased by effluxion of time, Mr. Dowden will carry on his practice at No. 314, Regent-street, W.

TWYFORD'S "DELUGE ADAMANT" WATER CLOSET.—Mr. Twyford sends us particulars and a diagram of this closet basin, the special recommendation of which is extra strength, the thinnest part being more than an inch thick. It is made in extra strong Cliffe Vale fire-clay.

THE SANITARY INSTITUTE.—At a meeting of the Council of this Institute, held on October 12, Professor Anthony Roche, Mr. R. E. Middleton, M.Inst.C.E., and Mr. W. Howard Smith, City Engineer, Carlisle, were elected Fellows. Fifteen members and fifteen Associates were duly elected. M. Bechmann, of Paris, was elected Honorary Fellow.

"CATHEDRAL COURT," GLASGOW.—The architects of this building, illustrated in our last, write to say that the roof was laid with Val de Travers asphalte, and not with Limmer's, as before stated. The mistake was not ours.

EXHIBITIONS IN SWEDEN.—A syndicate has been formed for establishing a permanent industrial exhibition in Stockholm, and it is proposed to hold a Scandinavian industrial exhibition in Malmö in 1896.

*See our illustrations of the staircase and dining-room, August 9, 1884.

THE INTERNATIONAL EXHIBITION IN ANTWERP, 1894.—The committee of the international exhibition to be held in Antwerp in 1894—to which we recently referred—has now been officially constituted. The Belgian Government has promised its support, and the communal authorities granted the necessary site, whilst the funds required have also been provided. In a short time invitations will be issued to the larger industrial concerns in all countries to attend the show.

FREEHOLD BUILDING LAND AT PINNER.—As will be seen by our advertising columns, Messrs. Debenham, Tewson, Farmer, & Bridgewater announce that they will offer for sale, on Monday next, about eight acres of freehold building land at Pinner, forming the first portion of the Royston Park estate, and immediately adjoining Pinner station on the London and North-Western Railway. Twenty-seven plots are to be sold, each having a frontage of 60 ft. to an avenue 50 ft. wide, and nearly all having a depth of 200 ft. The building-line is to be set back 35 ft. from the avenue, and only detached houses are to be built, one on each plot.

THE ENGLISH IRON TRADE.—There is again little alteration to chronicle in the English iron trade. Matters are very quiet, and there are but few fluctuations in prices. Cleveland pig is slightly lower. In manufactured iron and steel only a limited business is being done. Both shipbuilding and engineering are dull. The coal trade, however, is fairly brisk.—*Iron.*

THE INSTITUTION OF MECHANICAL ENGINEERS.—An ordinary general meeting of this Institution will be held on Wednesday and Thursday next, October 26 and 27, at 25, Great College-street, Westminster, by kind permission of the Council of the Institution of Civil Engineers, when the ballot-lists for the election of new Members, Associates, and Graduates, having been previously opened by the Council, the names of those elected will be announced to the meeting. The nomination of officers for election at the next Annual General Meeting will take place. The reading of papers will follow.

ROAD SURVEYORSHIP, DERBYSHIRE.—The Derbyshire County Council have increased the salary of Mr. R. C. Cordon, their Main-road Surveyor for Mid-Derbyshire, from 130*l.* to 150*l.* per annum.

A NEW SANITARY APPLIANCE.—Messrs. Wright Sutcliffe & Son, of Halifax, have sent for our inspection a specimen of their new patent closet-seat, which, they claim, constitutes a new departure in such things in point of comfort, cleanliness, and durability. The invention consists in covering the closet seat (or bath-top, for the invention is applicable to baths) with what they describe as "a tough, waterproof, non-conducting material." We are not told what the said material is, but it has very much the appearance of corticine. Undoubtedly this would usually present when dry a warmer surface to the user than a mahogany closet-seat or bath-top, and if the material be non-absorbent (as the term "waterproof" would imply) the new appliance is likely to find favour, especially for use by invalids.

PROPOSED NEW BRIDGE OVER THE MERSEY.—It is proposed to construct a bridge across the Mersey from Widnes, ten miles from Liverpool, to Runcorn, in Cheshire. The bridge will be used for vehicular traffic. The Corporation of Widnes has decided to seek Parliamentary powers to enable them to contribute 30,000*l.*, conditional on the town of Runcorn contributing a similar amount.

MEETINGS.

TUESDAY, OCTOBER 25.

British Museum.—Miss Emily Penrose on "Greek Vases of the British Museum: black-figured vases." II. 2.45 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Professor W. H. Corfield, M.A., on "Sanitary Appliances." 8 p.m.

WEDNESDAY, OCTOBER 26.

Institution of Mechanical Engineers. — Ordinary General Meeting. Two papers to be read. 7.30 p.m.

THURSDAY, OCTOBER 27.

Borough Road Polytechnic Institute.—Mr. Lewis F. Day on "Workaday Art." 8 p.m.

Institution of Mechanical Engineers. — Ordinary General Meeting (continued). 7.30 p.m.

FRIDAY, OCTOBER 28.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. Wright Clarke on "Details of Plumbers' Work." 8 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

15,139.—PAVEMENTS, &c.: *F. Haines.*—This invention relates to improvements in constructing cement or the like pavements, floors, platforms, walls, &c. The distinctive novelty as regards artificial pavements, &c., consists in the construction and application of one or more perforated binder-bars of iron or other suitable metal, and of straight or other shape, which are set on edge in the lower or concrete course of the block, and which extend into the top layer, or wearing course, so as to unite by the setting or solidification of the two courses the block and binders into a solid mass, of which the binder-plates form an integral part. Another portion of the invention consists in the employment of interlocking metallic binder-bars or plates.

15,195.—BUILDINGS, FIREPROOF WALLS, &c.: *C. Tomkins and J. A. Kinder.*—This invention undertakes to save space in buildings, to cause more air to circulate in them, and at the same time to make them fireproof, at considerably less than the usual cost. It is also claimed that the method of construction which is the subject of the patent is more sound-proof and firmer than wood partitions inside and outside of buildings for houses of every description, churches, chapels, schools, railway premises, and the like. This is effected by means of a mixture of cements and sand applied on one or both sides of a rigid mesh expansion metal supported with bar iron at the distances required, and secured from floor to floor, and from floor to roofs, with rolled-iron joists and other iron.

18,245.—BRICK-MAKING MACHINERY: *L. Seager.*—This invention relates to improvements in machines for making or moulding bricks, tiles, and the like, and consists in the combination with an intermittently rotated table of a series of mould boxes, in each of which is a sliding frame carrying a hinged or pivotted plate, forming the bottom of the mould, and adapted at certain intervals to be lifted and tilted in order to deliver a moulded brick. In connexion with the driving-shaft and rotating table is arranged a plunger, sliding in a box with guides, adapted so that as each mould is brought beneath it it descends and compresses the clay. A horizontally sliding knife is also provided for cutting off the clay which remains projecting above the moulds after the compression is completed. Mechanism is also provided for receiving the bricks and conveying them away.

18,311.—WINDOW-SASHES: *L. Seager.*—This invention relates to sliding and casement sashes to doors and the like, and has for its object to prevent rattling, and to render them dust and draught proof. When applied to a sliding-sash, one of the sash stiles is grooved, and the adjacent pulley-stile is also grooved, the two grooves being adapted to receive a pair of wedges, one of which has a sash-cord connected to it, and is connected to the sash in such a manner that it cannot move longitudinally relative thereto, but has a slight lateral movement. The other wedge, which is arranged between the first-mentioned wedge and the window-sash, is capable of a slightly longitudinal movement relative to the latter, and means are provided, such as by a lever, for effecting such longitudinal movement. After the sash has been opened or closed, the movement of the last-mentioned wedge presses the first wedge tightly against the pulley-stile, and so prevents the rattling of the sash and forms a tight joint.

10,831.—DOORS: *E. R. Baller.*—This specification describes an improved guard for preventing persons' fingers, clothing, &c., being shut between the hinged side of doors and frames. The inventor fixes to and at the edge of the frame near the door a piece or pieces of leather or other ductile material (called the guard), the other portion of the same projecting over and lying against the door. On the door, and covering this guard, is placed a cover.

13,644.—SASHES: *H. H. Lake.*—This invention relates to metal sashes or frames for holding the glass or other transparent material of a window, door, &c. Glass, especially art glass which is made to embody designs of various kinds, has been hitherto usually set in a lead

frame or sash, difficult of construction and expensive, besides rendering skilled labour necessary. In addition, various devices are frequently found to be necessary in order to prevent the glass bulging or sagging. By the employment of this invention it is claimed that all these objections are obviated, and that a strong and durable parallel window may be constructed at a greatly-reduced cost. The invention consists in a metallic frame-work or sash of peculiar character and construction, and in the combination therewith of suitable fastening devices for securing the parts of the sash or frame-work together.

NEW APPLICATIONS FOR LETTERS PATENT.

October 3.—17,582, T. Rhys, Appliance for Use with the Seats of Water-closets.—17,585, E. Mackness, Locking Window-sashes.—17,586, J. Hambiet, Pressing Bricks, Blocks, Tiles, &c.

October 4.—17,629, W. Copping, Bolts or Fastenings for Emergency Doors of Public Buildings.—17,633, P. Ovenden and H. Bunker, Water-pipes.—17,655, J. Mayne, Ventilator Attachment to Windows.—17,670, J. Pollock, Securing Window-sashes.—17,675, R. Dampier, Window-sash Frames. — 17,685, T. Edgeworth, Wood-Paving Blocks.

October 5.—17,699, R Coates, Automatic Gate or Door Stop for use where double gates or doors are required — 17,713, T. & H. Moorwood, Stoves, Grates, Cookery-ranges, &c.—17,729, H. Millar and J. Darley, Construction of Window-sashes to facilitate glazing, painting, or cleaning from the inside.—17,754, O. Berend, Filing and Setting Saws.

October 6.—17,780, P. Hancock, Tool-holder for use in connexion with boring, mortising, or tenoning machines. —17,800, J. Faulds, Stone-planing Machines.—17,810, E. Jamean, Decorative Plaques, Tiles, &c. — 17,853, S. Jennings and J. Morley, Water-closets.

October 7.—17,876, R Hindle, Wheelbarrows.

October 8.—17,942, W. Worssam, Band-saw Guide.—17,981, T. Bennett, Mouldings.

PROVISIONAL SPECIFICATIONS ACCEPTED.

14,062, R. Wilding, Wash-out Water-closets and the flushing of the same.—14,689, J. Cochrane, jun., Immovable Buffer for Water-closet Seats.—14,698, C. Price, Combination Drain-plug.—14,831, E. Hoyle, Fastening Sashes.—15,434, H. Lawrence, Simple Window-sash, reversing invention.—15,598, J. Cornelius, Sewer Ventilating Shafts or Chimneys, &c.—16,178, J. Moore, Grates and Stoves.—16 429, J. Mothersill, Door-knobs and Spindles.—16,448, J. Bartlett, Warming and Ventilating Buildings.—16,528, J. Northcott, Door-bolts.—16,556, W. Dearle, Cowls or Tops for Chimneys and Ventilating-shafts.—16,649, G. Evans, Wood-screws.—16,656, F. Plumstead, Electric-light Fittings.—16,736, A. Cruickshank, Chipping-tool. — 16,818, W. Knightly, Drain, Water, Gas, and other Pipes, and in the method of joining the same.—16,848, J. Rostron and J. Hilton, Imitation Tiles suitable for Hearths, Grates, Floors, &c.—17,239, H. Smolinski, Mitre Block and Joint Cramp.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

20,280, Craven, Dunnill, & Co. (Ltd.), and F. Smith, Tiles, &c.—21,004, H. Cribb, Preparing, Fitting, and Laying Blocks for Floors, Walls, or Ceilings of Wood or other material.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

OCTOBER 10.—By *Eastman Bros.*: 70 to 76 (even), Danby-st, Peckham, f., r. 104*l.*, 1,270*l.*; 160, Malpas-rd., New Cross, u.t. 72 yrs., g.r. 4*l*, r. 26*l.*, 285*l.*—By *E. Jackson*: 1, Agnes-st., Mile End, u.t. 69 yrs., g.r. 5*l.*, r. 32*l.*, 340*l.*

OCTOBER 11.—By *A. & R. Beal & Co.*: l.g.r. of 125*l.*, Notting-hill, utt. 71 yrs., g.r. 52*l.*, 1,300*l.*; 2 to 12 even, Carnarvon-mews, u.t, 71 yrs, g.r. 31*l.* 10s., r. 125*l*, 675*l.*; 40 and 44, Walmer-rd., u.t. 71 yrs., g.r. 16*l.*, 210*l*—By *Humbert, Son, & Flint*: Enclosures of f. land, Wallington, 62a. 2r. 37p., 5,750*l.*; a plot of f. land, 587*l.* 10s.—By *Moss & Jameson*: 2 and 4, Stamford Brook-rd., Shepherd's Bush, u.t. 83 yrs., g.r. 8*l.*, r. 70*l*, 650*l.*; a profit rental of 10*l.* a year, Upper North-st., Poplar, with reversion, u.t. 61 yrs., 430*l.*; 56 and 58, Stebondale-st., Cubitt-town, u.t. 58 yrs., g.r. 6*l.* 12s., r. 58*l.* 8s., 500*l.*—By *E. & H. Lumley*: No. 43, Haymarket, u.t. 24 yrs., g.r. 40*l.*, r. 135*l.*, 1,460*l* ; 1 to 5, Jermyn-st., u.t. 24 yrs., g.r. 170*l.*, 7,300*l.*—By *C. & H. White*: 22, Mawbey-st., Lambeth, u.t. 67 yrs., g.r. 4*l.*, 310*l* ; 59, Thorne-rd., u.t. 68 yrs , g.r. 6*l.* 12s , r. 34*l.*, 355*l.*; 99, Farmer's-rd., Kennington, u.t. 58 yrs., g.r. 3*l.*, 400*l.*

OCTOBER 12.—By *Daniel Smith, Son, & Oakley*: "Cage Farm" and 534 acres, Southminster, Essex, f., r. 300*l.*, 3,045*l.*—By *Ramsey & Co.*: 96, Queen's-rd., Peckham, f., r. 64*l.*, 870*l.*; 5, Chetwode-rd., Tooting, u.t. 87 yrs., g.r. 6*l.* 12s. 6d., 200*l.*—By *G. A. Wilkinson & Son*: "The Quorn House Estate," Leicestershire—"Tacey's Barn Farm," 27a. 1r. 30p., f., r. 37*l.* 12s., 1,500*l.*; "Rushall Fields Farm," 44a. 1r. 24p., f., r. 60*l.*, 2,500*l.*; "Angrave's Farm," 125a. 2r. 12p., f., r. 162*l.* 18s. 8d., 7,000*l.*; "Woodhouse Eaves Farm," 82a. 1r. 30p., f., r. 119*l.* 5s., 5,400*l.*; numerous enclosures of f. land, 183a. 3r. 24p., 14,395*l.*; ditto, f. houses and cottages, 3,765*l.*

OCTOBER 13.—By *Stimson & Sons*: 64, Wellington-st., and 112, Armada-st., Deptford, f., r. 60*l.*, 800*l.*; 27, Barrington-rd., Brixton, u.t. 30 yrs., g.r. 7*l.*, 410*l.*; 10, Bellefields-rd., u.t. 72 yrs., g.r. 19s., r. 36*l.*, 405*l.*; 37, 39, 41, and 61 to 71 (odd), Verney-rd., Old Kent-rd., u.t. 80 yrs., g.r. 45*l.*, 935*l.*; 9, Dunstan's-rd., Dulwich, f., r. 36*l.*, 275*l.* By *W. Winterton*: 59 to 65 (odd), Morning-lane, Hackney, u.t. 81 yrs., g.r. 29*l*, 880*l.* By *C. C. & T. Moore*: F.g.r. of 30*l.*, Cambridge-rd., Bethnal-green, reversion in 83 yrs., 830*l.*; 3 and 4, Church-st., Spitalfields, f., r. 88*l.*, 2,060*l.*; Nos. 53, 54, and 55, and 1 to 4, Bridegroom-ct., Hoxton-sq., 1,260*l.*; "The Laurels" and "Woodlands," St. Ann's-rd., Stamford-hill, and a plot of land, total area 13,400 ft., 750*l.*; 1 to 4, St. Ann's-rd., f., r. 66*l.*, 770*l.*; 24, Molyneux-st., Bryanston-sq., f., r. 63*l.*, 850*l.*; 29 and 30, Molyneux-st., f., r. 50*l.*, 1,460*l.*; "The George" and "Canton's Tavern," 6 and 7, Moor-st., and 35, 36, and 37, Church-st., Cambridge-circus, f., 9,550*l.* By *Newbon & Co.*: F.g r. of 10*l.*, Danby-st., Peckham, reversion in 83 yrs., 270*l.*; f.g.r. of 77*l.*, Prebend-st., Islington, ditto in 34 yrs., 2,800*l.*; f.g.r. of 3*l.* 6s. 8d., Britannia-rd., ditto in 34 yrs., 120*l.*; f.g.r. of 30*l.* 13s. 4d., Prebend-st., ditto in 34 yrs., 1,125*l.*; 37, Cumberland-st., Barnsbury, f., 530*l.*; 314, Gray's-inn-rd., f., r. 100*l.*, 2,420*l.*; 2, Parkhurst-ter., Southgate, u.t. 86 yrs., g.r. 6*l.* 10s., 90*l.*; 9 to 17 (odd), Alsen-rd., Holloway, u.t. 80 yrs., g.r. 17*l.* 10s., r. 130*l*, 925*l.*; 40 and 42, Dalby-st., Kentish Town, u.t. 76 yrs., g.r. 14*l.*, r. 93*l.*, 490*l.*; 48 and 50, Dalby-st., u t. 76 yrs., g.r. 18*l*, r. 74*l.*, 535*l.*; 1, Wilkin-st., u.t. 76 yrs , g.r. 8*l*, 195*l.*

OCTOBER 14.—By *Baker & Sons*: f.g r. of 84*l.*, Verney-rd., Bermondsey, reversion in 85 yrs., 2,275*l.*; f.g.r. of 63*l.*, Cranswick-rd., ditto in 85 yrs., 1,600*l.*; f.g.r. of 50*l.*, Bramcote-rd., ditto in 85 yrs., 1,285*l.*; f.g.r. of 10*l.*, Credon-rd., ditto in 85 yrs , 260*l.*; f.g.r. of 36*l.*, Verney-rd., ditto in 85 yrs., 930*l.*; f.g.r. of 32*l*, Varcoe-rd., ditto in 85 yrs., 830*l.*; f.g.r. of 131*l.* 6s , Credon-rd., ditto in 85 yrs., 3,385*l* ; f.g.r. of 60*l.*, Varcoe-rd , ditto in 85 yrs., 1,560*l.*—By *Wootton & Green*: l.g.r. of 20*l.* 10s., Castelnau, Barnes, u.t. 47 yrs., g.r. 17*l.* 2s., with reversion, 95*l* ; a similar l g.r. realised 90*l.* ; l.g r. of 20*l.* 5s., u.t. 47 yrs., g.r. 7s., 515*l.* ; l.g.r. of 61*l*, u.t. 47 yrs., g.r. 14s., 1,530*l.* ; l.g.r. of 2*l.* 2s., u.t. 47 yrs., no g.r., 80*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g r. for leasehold ground-rent; l.g.r. for improved ground-rent; g r. for ground-rent; r. for rent; f. for freehold; c. for copyhold: l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.

Greenheart, B.G. ton	9/0 0	0.0 0
Teak, E.I... load	9/10 0	15/0 0
Sequoia, U.S. ft. cu.	2/4	3/0
Ash, Canada load	2/10 0	4/0 0
Birch, do.	3/5 0	4/10 0
Elm, do.	3/10 0	4/15 0
Fir, Dantzic, &c.	1/10 0	3/10 0
Oak, do.	3/0 0	5/5 0
Canada.....	5/10 0	7/0 0
Pine, Canada red	2/10 0	3/10 0
Do, yellow	2/10 0	5/0 0
Lath, D'ntsic, fath	5/0 0	6/0 0
St. Petersburg	5.0 0	7/0 0
Deals, Finland 2nd & 1st std 100	7/10 0	9/10 0
Do, 4th & 3rd ..	7/0/0	8/0/0
Do, Riga	6/10 0	8/0 0
St. Petersburg, 1st yellow ..	10/10 0	14/10/0
Do. 2nd yellow	8/0/0	9/10/0
Do. white	7/0/0	9/10/0
Swedish	7/0/0	16/0/0
White Sea	8/0/0	17/0/0
Canada, Pine 1st	20/0/0	26/10/0
Do. do. 2nd....	14/10/0	16/0/0
Do. do. 3rd, &c.	7/10/0	10/0/0
Do. Spruce. 1st	8/10/0	11/0 0
Do. do. 3rd & 2nd.....	6/5.0	8/0/0
New Brunswick	6/10.0	7/0/0
Battens, all kinds	3/10/0	15 10 0
Flooring Boards, sq., 1 in. prep. 1st	0/8/0	0/13.0
Do. 2nd.....	0/7/0	0/10/0
Other qualities	0/3 0	0 7/6
Cedar, Cuba ..ft.	/3½	/4½
Honduras, &c.	/3¼	/4
Mahogany, Cuba.	/4½	/6½
St. Domingo, cargo av	/4	2/0
Mexican do. do	/4	/5
Tobasco do. do	/5	/7
Honduras do..	/5	/6½
Box, Turkey ton	4/0/0	13/0/0
Rose, Rio.....	10/0.0	20/0/0
Bahia	9 0 0	12/0/0
Satin, St. Domingo ...ft.	0 0 7	0/1/3
Porto Rico	0/0/7	0/1/6

TIMBER (*continued*).

Walnut, Italian..	0 0 3½	0/0/7

METALS.

IRON—Pig, in Scotland .....ton	2/1/6	0/0/0
Bar, Welsh, in London.....	5/17/6	6 0/0
Do. do. at works in Wales	5/7/6	5/10/0
Do. Staffordshire, in London	6 5/0	6/15 0
COPPER—British, cake and ingot	49 10/0	50/0/0
Best selected ..	50.10/0	51.0/0
Sheets, strong..	58/0/0	0/0/0
Chili, bars	45/17/6	46 5/0
YELLOW METAL lb.	0/0/5	0/0/5½
LEAD — Pig, Spanish ....ton	10/7/6	0/0/0
English, com. brands	10/12/6	10/15 0
Sheet, English, 3 lbs. per sq. ft. and upwards ..	12/5/6	0.0 0
Pipe	12/15/0	0/0.0
ZINC — English sheet .....ton	23.0.0	0/0.0
Vieille Montagne.....	23/10/0	0 0.0
TIN—Straits	95/0/0	95/10/0
Australian	95/10/0	96 0/0
English Ingots.	97/10 0	98 0 0
Banca	95/0/0	95/5/0
Billiton	94/10/0	94/15/0

OILS.

Linseed .....ton	18.12 6	0.0.0
Cocoanut, Cochin	24/0.0	24 5 0
Do. Ceylon	21/10/0	0 0 0
Palm, Lagos	24/0/0	0/0/0
Rapeseed, English pale	24.10.0	0/0/0
Do. brown	22/15/0	23/0/0
Cottonseed ref...	18/10/0	0/0/0
Oleine	20/10/0	21/0/0
Lubricating, U.S.	4/0/0	5/0/0
Do. refined	5/10/0	12/0/0
TAR — Stockholm barrel	0/17.6	0/18.6
Archangel	0/12/6	0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Thursdays.*]

ALFRETON (Derbyshire).—For the erection of new hotel, Alfreton, for Messrs. J. Hole & Co. Mr. R. F. Vallance, architect, Mansfield :—

S. & G. Frisby	£2,400	0	0	Fisher Bros.....	£2,159	0	0
J. J. Adams	2,240	0	0	W. Walkerdine	2,100	0	0
Wm. Maule	2,218	0	0	J. Roe & Son, Alfreton (accepted)	1,987	17	6
G. Bell & Sons	2,183	0	0				

APPLEBY (Westmoreland).—For the execution of water-supply works, Longmarton and Brampton, for the East Ward Union Rural Authority. Mr. Geo. Watson, engineer, 3, St. Andrew's-place, Penrith. Quantities by the engineer :—

Contract No. 1.—*Cast-Iron Pipes.*

W. Towler.....	£1,205	9	5	Macfarlane, Strang, & Co.	£854	13	11
Newton, Chambers, & Co.	1,000	0	0	James Ritchie'.....	851	0	0
Birtley Iron Co.	980	0	0	Dodds Brothers & Co.	850	19	5
Hughes & Gotto	966	16	8	John Shaw & Co.	842	1	3
E. & W. H. Haley j..	937	15	0	J. Macewan & Co. ..	840	12	0
Cochrane & Co.	933	18	7	Laidlaw & Son	828	15	6
Clay Cross Iron Co.	932	19	9	Joseph Jackson	828	4	6
R. Maclaren & Co...	901	0	3	W. Tydd & Son	827	10	0
Cochrane, Grove, & Co.	881	3	10	Cameron & Roberton	812	18	0
StantonIronworkCo.	864	11	0	Skelton & Co.	812	15	6
Thomas Allan & Son	856	3	1	Fisher & Co.	812	12	0

Payne-Gallwey, Pickering, & Co. (pipes only), at 12l. 10s. per ton.

Contract No. 2.—*Valves and Hydrants.*

W. Towler & Co.....	£146	16	10	Macfarlane, Strange, & Co.	£76	14	1
W. Tydd & Son	115	5	0	Stone & Co., Deptford..	71	0	0
Hughes & Gotto	107	14	4	Dodds Brothers & Co...	61	8	4
Laidlow & Son.....	90	10	6	Joseph Jackson.....	64	3	0
Glenfield Co.	93	6	8	Blakeborough & Sons ..	60	5	9
Fisher & Co.....	89	16	0	Hamil on Woods & Co.	58	10	0

Contract No. 3.—*Carting and Laying Cast-iron Pipes.*

Hughes & Gotto	£960	7	7	Joseph Dixon	£436	3	6
Dodds Brothers & Co.	679	7	9	George Dixon	398	0	0
Thomas Bell.....	688	17	0	Fisher & Co.....	390	12	0
George Robinson	603	16	0	Joseph Jackson	299	12	9
W. Tydd & Son	589	11	10				

Contract No. 4.—*Service Reservoir and Collecting Tank.*

Oswald Lister	£316	17	5	George Robinson	£238	9	11
John Robinson	298	11	5	George Dixon	231	4	0
Dodds Bros. & Co.	292	7	3	Joseph Jackson	229	14	6
Fisher & Co.....	281	2	3	Anthony Watson	214	10	0

For the Whole.

Harrison & Burns ..	£1,284	0	0	Joseph Jackson, Penrith *	£1,421	14	9
Dodds Bros. & Co...	1,884	2	9				
Fisher & Co.....	1,574	2	3				

* Accepted.

* This contractor having declined to take up Contract No. 3 alone, the Authority has accepted his Tender for the whole.

BANSTEAD.—For building detached house at Banstead, Surrey. Mr. Frederick W. Ledger, architect, 3, Lombard-court, E.C. Quantities by Mr. William Burrell, 9 Adam-street, Adelphi, W.C. :—

Woodward	£2,209	B. E. Nightingale	£1,985
Bryant & Son	2,175	Mills.....	1,956
J. Smith	2,047	Adams.....	1,953
W. Notley.....	2,020	Reynolds	1,876
Gregory	2,000	Martin Taylor.....	1,807
Potter.....	1,995		

BRENTFORD.—For draining part of proposed market, Kew-bridge, for the Brentford Local Board. Mr. J. H. Strachan, Surveyor, Clifden House, Boston-road, Brentford :—

J. Dixon	£570 0 0	A. G. Holte	£453 0 0
J. Haywood.....	534 0 0	G. Bright	450 0 0
J. G. Chapman	531 18 7	J. Ball.....	417 6 2
J. Bloomer	530 10 0	R. N. Rhodes	415 4 6
R. Parry	525 0 0	H. Lee.....	410 0 0
W. J. Botterill	511 0 0	W. Parker, Brentford (accepted)	408 18 11
T. Adams	509 8 0		

[Surveyor's estimate, £450.]

CHESHUNT.—For the construction of sewer, &c., Prospect-road, for the Local Board. Mr. T. Bennett, Surveyor, Turner's-hill, Cheshunt :—

Matthews & Son	£151 10	E. J. Betts	£124 0
Thos. Adams	128 10	Pavey, Waltham Cross*..	95 0
J. Jackson	127 0		

* Accepted.

CROYDON.—For supplying and fixing stoneware trough, water-closets, and automatic flush tanks in the Boys' department, Mitcham-road schools, for the Croydon School Board, under the superintendence of Mr. Robert Ridge, Surveyor to the Board :—

Doulton & Co.	£126 10	Hammond & Hussey.....	£85 0
Finch & Co.	88 0	Wenham & Waters*	76 10

* Recommended by the Works Committee for acceptance.

DOVER.—For widening parts of the Union-road, for the Corporation of Dover. Mr. Walter Thomas, C.E., Borough Engineer and Surveyor :—

G. Lewis & Sons, High-street, Dover (accepted) ..	£220 0 0
J. H. Bushell (informal)	193 0 0

ELTHAM (Kent).—For repairs to "Elderslie," Eltham, Kent, for Commander Robinson, R.N. Mr. John Jas. Downes, architect, 11, The Parade, Lewisham High-road, S.E. :—

S. Mitchell	£130 0 0

FELTHAM (Middlesex).—For the erection and maintenance of an isolation ward, and lavatory and bath-room annexe, to the infirmary of the Feltham Industrial School, for the London County Council :—

Reed, Blight, & Co., Limited	£2,264 15 0	G. Gibson	£1,985 12 10
W. H. Lascelles & Co.	2,127 1 0	Robinson & Francis	1,938 4 8
F. C. Chapman	2,047 17 2	Maxwell Bros., Lim.	1,916 0 0
G. Gray	2,003 2 0	J. F. Collinson	1,700 13 0
		Charles Jackson....	1,597 7 6

HAMMERSMITH.—For road-making, &c., and sewerage work, Trussley and Waldo-roads, for the Vestry. Mr. H. Mair, Surveyor, Vestry-hall, Hammersmith :—

	Waldo-road Sewer.		Trussley-road.
Nowell & Robson	—	....	£865
Edward Parry	£620	....	—
James Dickson	506	....	—
E. Rogers & Co., Notting-hill	393*	....	917
Tomes & Wimpey, Hammersmith	446	....	840*

* Accepted.

HAYWARDS' HEATH.—For the formation of a new road and sewer about 950 ft. in length, for the Local Board. Mr. William Beach, Surveyor, Haywards' Heath, Sussex :—

J. Marshall	£932 0 0	Kavanagh	£721 16 11
T. Adams.....	810 0 0	Holman & Co.....	697 0 0
Catley	775 0 0	Langridge, Croydon*	695 0 0

* Accepted.

HOLNE (Devonshire).—For building a house at Holne, for the Hon. R. Dawson, J.P. Mr. W. M. Tolhit, architect, Totnes :—

F. Easterbrook, Holne, Ashburton.....	£288 15 0

LONDON.—For road-making, &c., Harford-street and Ben Jonson-road, Mile-end Old Town, for the Vestry. Mr. J. M. Knight, Surveyor, Vestry Hall, Mile-end Old Town, E. :—

	Pitching. s. d.		Concrete. s. d.		Excavate and Cart. s. d.
Biggs	14 0	.....	11 0	.....	5 0
Mowlem & Co.	15 8	.....	4 0	.....	4 6
Woodham & Fry.....	15 11	.....	4 6	.....	5 0
Griffiths.....	15 6	.....	3 9	.....	4 6
Rutty	14 11	.....	3 6	.....	4 9
Wheeler (accepted).....	13 11½	.....	3 4	.....	4 3

LONDON.—For road-making, paving, &c., Hartopp and Werley avenues, for the Vestry of Fulham. Mr. W. Sykes, Surveyor, Town-hall, Walham-green :—

Hartopp-avenue.

	York.	Patent Adamant.	Victoria.	Stuart's Granolithic.	Imperial.	Enderby.
	£	£	£	£	£	£
Mowlem & Co.....	344	315	330	315	300	—
S. Hudson.....	345	256	292	—	285	—
J. Biggs	358	293	340	302	302	330
Nowell & Robson..	387	272	—	—	—	—
Tomes & Wimpey .	361	276	—	—	—	—
Imperial Stone Co.	—	—	—	—	3.1	—

Werley-avenue.

Mowlem & Co.....	324	297	310	297	284	—
S. Hudson	309	233	264	—	258	—
J. Biggs.....	354	290	336	299	299	327
Nowell & Robson..	330	253	—	—	—	—
Tomes & Wimpey .	333	257	—	—	—	—
Imperial Stone Co.	—	—	—	—	260	—

LONDON.—For the proposed studios, at 5 Edwardes-square, Kensington, for Mr. John Crowle. Mr. Chas. R. Guy Hall, architect :—

John Barker & Co.	£3,710 10	Leslie & Co.*	£2,537 0
Stafford Hill	3,450 0	Whitaker	2,300 0
Kearley	2,607 0		

* Accepted subject to modifications.

LONDON.—For alterations and additions at 64, Kensington High-street, for Mr. Henry Griffiths. Mr. Chas. R. Guy Hall, architect :—

Barker & Co	£210 0	F. Giles & Co.....	£148 10
W. Nash	205 0	Leslie & Co.....	130 0
C. F. Kearley.....	194 10		

LONDON.—For heating and ventilation at Warwick-gardens Wesleyan Church, for the Trustees. Mr. Chas. R. Guy Hall, architect :—

John Barker & Co.	£396	J. Whitaker.....	£351
C. F. Kearley.....	386	Stafford Hill.....	345

LONDON.—For alterations and additions at No. 21, High-street, Kensington, for Mr. A. Abrahams. Mr. Chas. R. Guy Hall, architect :—

Stafford Hill	£736	L. & S. W. Ranson.....	£595
John Douglas	676	Frank Giles & Co.*	589
George Bowles	665		

* Accepted.

LONDON.—For additions at No. 216, Amherst-road, London, for Mr. W. Brown. Mr. Alfred Richards, surveyor :—

M. A. Humphreys & Son....	£238	Jarvis & Sons	£183
H. Knight & Son.....	245	A. Porter	177
Wilson & Co.....	199		

LONDON.—For rebuilding No. 15, Market-terrace, Green-lanes, N., for Mr. Palmer. Mr. John E. Pinder, architect, Bridge House, South Tottenham :—

H. Knight & Son.....	£435	A. Monk.....	£399
F. Voller	433	Say	348

LONDON.—For the erection of stabling, &c., and outbuildings, at Wanstead. Mr. Herbert Riches, architect and surveyor, 3, Crooked-lane, E.C. :—

F. L. Willmott	£750	North Bros.	£690
J. Jolliffe	720	T. Osborn & Sons (accepted)	683

LONDON.—For erecting sixteen houses, Hart's-lane, Bethnal-green, for Col. Warde. Messrs. T. & W. Stone, architects, Great Winchester-street, London-wall, E.C. :—

J. Jarvis & Sons	£5,130	Gregar & Son	£4,367
Wire & Forrest	4,697	G. Knight & Sons, Can-robert-street, Bethnal-green (accepted)	3,907
Thomerson & Son	4,682		
Higgs	4,600		
Roome	4,587		

LONDON.—For alterations and additions at No. 10, Bentinck-street, Cavendish-square. Mr. Robert Willey, architect and surveyor, 33, New Bridge-street, E.C. :—

Rowe	£2,000 0	Holliday & Greenwood	£1,039 0
Traies & Son	1,133 0	Carmichael	964 0
Kellaway	1,092 17	Jones	825 0

LONDON.—For converting the private dwelling-house, No. 34, Northcote-road, Clapham-junction, into a shop. Mr. M. V. Treleaven, architect and surveyor, Acre-lane, Brixton :—

Clarke	£523	Sumner	£442
Summerford & Son	521	Smart & Son	398
Maxwell (Limited)	444	Rice & Son	375

LONDON.—For alterations and decorations at No. 194, Queen's-gate, S.W., for Mr. W. Norton. Mr. R. A. Briggs, architect, 2, Devonshire-square, Bishopsgate-street Without. Quantities by Messrs. Pryce Cuxson & Leigh, 17, Victoria-street, Westminster, S.W. :—

Foster & Dickson	£3,887	Holloway Bros.	£3,331
Harrison & Spooner	3,670	Patman & Fotheringham	3,273
B. E. Nightingale	3,335		

LONDON.—For building Ward's Schools, Thames Embankment, for the Corporation of the City of London. Mr. A. Murray, City Surveyor :—

A. Kellett	£23,858	Nightingale	£17,547
Lascelles	19,759	Kirk & Randall	17,420
Chessum	19,610	Killby & Gayford	17,236
Lawrance & Son	18,800	Perry & Co.	17,227
Charteris	18,547	Mowlem & Co.	16,976
J. T. Chappell	18,547	Atherton & Latta	16,812
Brass & Son	17,843		

LONDON.—For rebuilding premises, 24, 25, and 26, Long Acre. Mr. C. A. Legg, architect, 13, Grafton-street, Mile-end. Quantities by Mr. W. Hawker :—

F. & J. Wood	£868	Howard & Co.	£734
Patman & Fotheringham	793	Nightingale	718

LONDON.—For taking down and rebuilding stables and granary at rear of 103, High-street, Deptford, S.E., for Mr. Jas. Murray. Mr. John Jas. Downes, architect, 11, The Parade, Lewisham High-road, S.E. :—

R. Soper	£1,580 0	W. H. Lorden & Son	£967 0
A. Wilson	1,510 0	S. R. Best*	924 10
T. D. Leng	1,018 0		

* Accepted.

LONDON.—For repairs to Normanby Wharf, Ravensbourne-street, Deptford, S.E., for Mr. W. C. Mockford. Mr. John Jas. Downes, architect, 11, The Parade, Lewisham High-road, S.E. :—

A. Wilson £195 15 0

LONDON.—For repairing and painting factory, offices, &c., at Nos. 64, 66, 68, and 70, Gray's Inn-road, for Messrs. Francis & Co. Mr. Walter Graves, architect, Winchester House, Old Broad-street, E.C. :—

B. E. Nightingale	£113 0	D'Oyley & Co.	£105 0
Pitman & Son	113 0	Houghton & Son	93 0
Shaw	112 0	Seigmann	85 10
Maxwell Bros.	111 0		

LONDON.—For new front and fittings at the "Plough Tavern," Hornsey-road, for Mr. Fielding. Messrs. Thorpe & Furniss, architects. No quantities supplied :—

Anley	£1,494	Lamble	£1,387
Toms	1,479	H. & F. Fearman	1,375
Voller	1,457		

LONDON.—For alterations and new teak front at 156-158, High-road, Kilburn, for Messrs. J. Hepworth & Son, Limited. Mr. H. T. Bonner, architect, King-street, Cheapside :—

Allen & Sons	£568 0 0	H. Fagg	£393 0 0
W. Rosenberg, 64, Westminster Bridge-road, S.E.*	425 2 6	J. Yearbury	320 0 0

* Accepted.

LONDON.—For alterations to the "Mitre Tavern," Fish-street-hill, E.C., for Mr. H. A. Baxter. Mr. J. Warne, architect, Peckham :—

J. & W. Taylor	£512 9	F. H. Hopkins	£505 0
J. Hosborn	508 0	W. Rosenberg	484 15

LONDON.—Accepted for alterations and new teak shop front, at 247, Old Kent-road, for Messrs. J. Hepworth & Sons, Limited. Mr. H. T. Bonner, architect, King-street, Cheapside :—

W. Rosenberg, 64, Westminster Bridge-road, S.E. £250 0 0

MANNINGTREE.—For alterations and additions to the Wesleyan Schools. Mr. J. W. Start, architect and surveyor, Cups-chambers, Colchester :—

T. Canham	£245 0 0	F. B. Capon	£230 0 0
S. Parsons	240 0 0	G. R. Hawkins	212 1 6
F. Dupont	236 0 0	W. Fenn	210 7 0
T. Carrington	234 0 0	J. Welham, Clacton-on-Sea (accepted)	204 9 6
Ripper Bros.	230 0 0		

MANSFIELD (Notts.).—For the execution of sewerage works, Newgate-lane, &c., for the Corporation. Mr. R. Frank Vallance, Borough Surveyor, Mansfield :—

	Newgate-lane.	Church-lane.
J. Tomlinson	£256 2 5	£232 9 7
Fisher Bros.	253 0 0	251 0 0
Revill	230 8 6	203 13 9
J. Bradley, Lincoln	184 10 9	172 13 0*
W. A. Vallance, Mansfield	178 0 0*	....

* Recommended for acceptance.

MANSFIELD (Notts.).—For alterations to premises in connexion with the "Blue Boar" Inn, Mansfield, for Mr. T. Taylor. Mr. R. Frank Vallance, architect, Mansfield :—

J. Greenwood	£533	W. A. Vallance	£462
S. & G. Frisby	530	G. Bell & Son	456
Fisher Bros	496	E. Cuddy	440

MANSFIELD (Notts.).—Accepted for alterations to premises, Warsop, near Mansfield, for Mr. W. White. Mr. R. Frank Vallance, architect, Mansfield :—

Adam Eastwood, Warsop £271 0 0

NORTHFLEET. — For alterations and additions to Catholic Church. Mr. J. T. Walford, architect. Quantities supplied :—

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Dering	615 0 0	Multon & Wallace, Gravesend*	498 10 0
Tuffee	589 0 0		

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WALLASEY (Cheshire).—For erecting a villa residence at Wallasey, for Mr. Wm. Field Cox. Mr. T. C. Ebdy, architect, 30, North John-street, Liverpool. Quantities by Mr. R. Klamroth :—

	Villa.	Addenda.
Tomkinson & Sons	£1,187 0 0	£230 0 0
Bleakley & Co.	1,180 0 0	250 0 0
John Shaw	1,096 16 6	197 16 6

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McFall	£1,546	Crosbie	£969
Bellis	1,235	Adams	968
Tipping	1,092	Musker	960
Naylor	1,048	Burns	958
Bleakley	990	Lonsdale	933
Burt	971	Jones & Bancroft	

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Kenny	£540 0	Kelland	£405 0
Sheffield	456 0	Evans	349 8
Watling	438 0	Lawrance	315 0
Hunt	431 0	Pearce, New Southgate*	278 0
Reed	413 0	Richardson	144 10

* Accepted.

[Architect's estimate, £325.]

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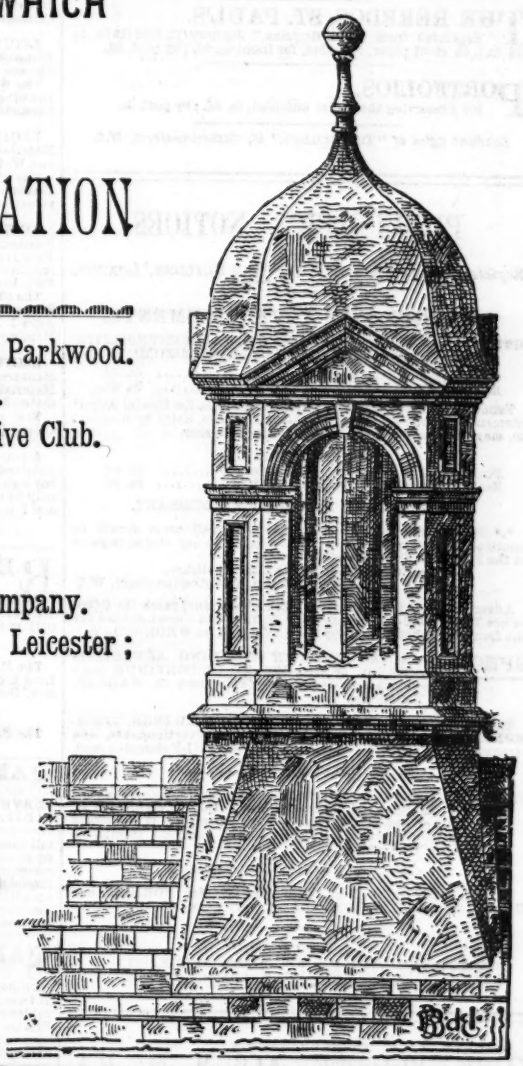

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Must be a capable designer and practical man. Salary, 2l. a week, with an increase if found capable.—Reply by letter to C. J. at Hornecastle's, Cheapside, London.

ASSISTANT for Drawing Office. Accustomed to ornamental ironwork construction. Able to take out quantities and estimate cost.—Apply, with full particulars as to age, qualifications, and remuneration required, to the FALKIRK IRON CO. Falkirk.

QUALIFIED ASSISTANT WANTED

for four months (with prospect of permanency) in a County Surveyor's Office. Experience in bridge work essential.—Full particulars to Box 284, Office of "The Builder."

PUPIL.—An Architect (F.R.I.B.A.) with

an established practice in the City, has a VACANCY for an ARTICLED PUPIL. Moderate premium.—Address in first instance, Z. X. 567, Messrs. Deacon's, Leadenhall-street, E.C.

TO PARENTS and GUARDIANS. — The

Borough Engineer of Lowestoft has a VACANCY for a PUPIL.—For terms, apply to G. H. HAMBY, Town Hall, Lowestoft.

YOUNG MAN (Active and Steady)

WANTED, for Manufacturing Sanitary Engineer's Office. Preference given to one from similar employ, and a good ultimate position ensured to a capable man.—Write fully to Box 283, Office of "The Builder."

BUILDER and CONTRACTOR'S CLERK

WANTED. Must be an accurate measurer, understand book-keeping and office routine. Abstainer preferred.—State age, experience, and salary required. Box 290, Office of the "Builder."

CORRESPONDING CLERK WANTED,

in Office of Sanitary Engineer. Must have a knowledge of architectural drawing.—Address, enclosing copies of testimonials, and stating age, position, and salary expected, Box 282, Office of "The Builder."

WANTED, in West-end Builder and

Decorator's Office, a JUNIOR CLERK, aged about 18, who must have had previous experience of the trade, accustomed to keeping time-book, booking material, &c. Hours, 6.30 to 5.30.—Reply, stating age, experience, and salary required, Box 287, Office of "The Builder."

JUNIOR CLERK WANTED, in Builder

and Decorator's Office. Must be used to West-end trade and able to trace.—Reply only by letter, in own handwriting, stating age and salary expected, to P. 27, Southampton-row, W.C.

JUNIOR CLERK WANTED, by London

Builder. Shorthand and ledger. Hours, 8.30 a.m. to 6.30 p.m.—Address, stating age, references, and salary required, to Box 288, Office of "The Builder."

LAD WANTED, in a Builder's Office.

Good writer, and capable of tracing drawings and squaring dimensions.—Apply, with age, references, and salary required, to Box 286, Office of "The Builder."

GENERAL FOREMAN WANTED. Must

be able to carry out good sound work reasonably.—State age, trade, experience, names of last two employers, and salary, to Box 285, Office of "The Builder."

GENERAL WORKING FOREMAN.—

WANTED, for a Country Estate with several houses, an experienced MAN, about 30 years of age, competent to undertake general repairs and new buildings, and also to draw out plans and specifications. Carpenter and Joiner by trade. Permanent situation to a suitable man.—Apply by letter, with full particulars as to age, experience, and wages required, to A. B. C. care of Messrs. Wm. Dawson & Sons, 161, Cannon-street, London, E.C.

GENERAL FOREMAN required for an

Alteration Job near London. Must be very experienced Carpenter and joiner by trade.—Apply by letter, stating particulars, last employment, age, and wages required, to Box 292, Office of "The Builder."

SHOP FOREMAN of JOINERS Wanted.

Competent, energetic. — Apply, G. E. HAWES, Builder, Norwich.

MASONS (Good) WANTED. Accustomed

to Reredos and Altar work. None but experienced men need apply. — Address, R. L. BOULTON & SONS, Architectural Sculptors, Cheltenham.

MACHINIST (Joiner) WANTED. Total

abstainer preferred. State wages and experience.—Box 289, Office of "The Builder."

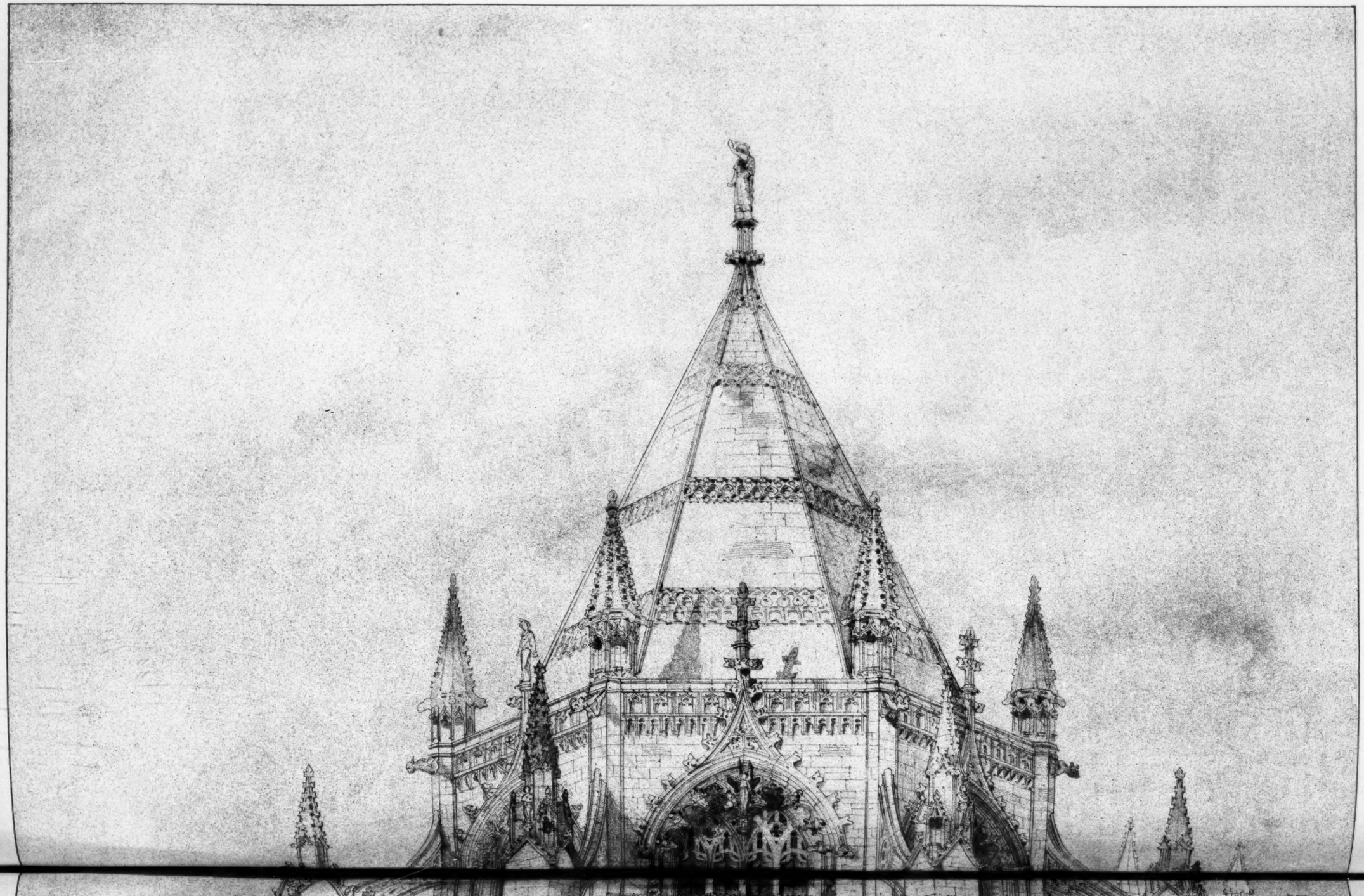
PLUMBER WANTED (Good Jobbing).

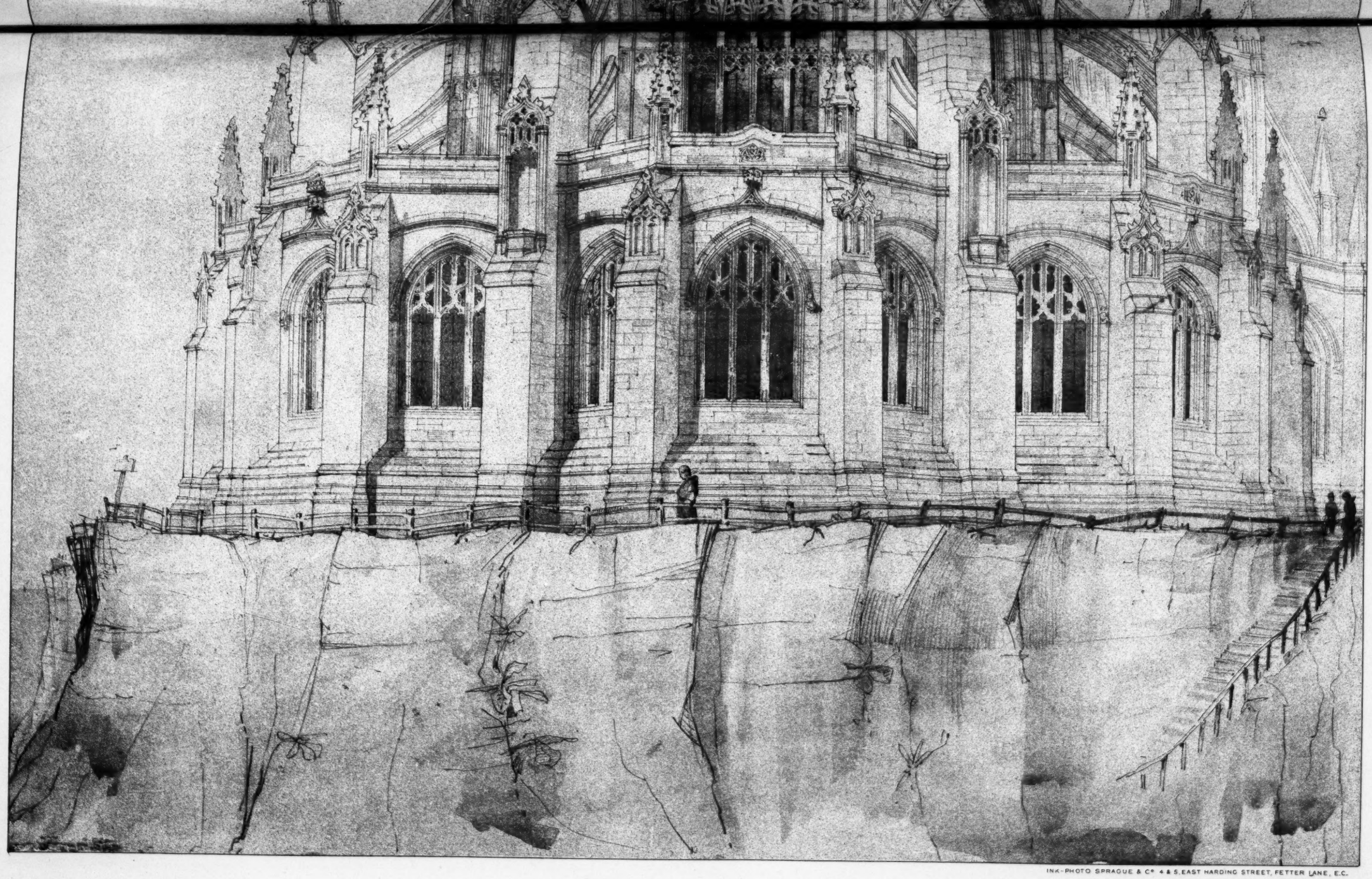
Practical and steady man. Constancy if suitable. Good references indispensable.—Apply by letter to Box 291, Office of "The Builder."

GOOD PLASTERERS can have EMPLOYMENT at full London wages by applying personally between ten and two o'clock, or by letter, to the SECRETARY of Master Plasterers' Association, Broad-street-avenue, Broad-street, E.C.

DRAWINGS, TRACINGS,

ARCHITECTURAL DESIGNS.
Plans, Details, Construction & Decoration, Photo-copies, Typewriting.
Temporary Assistance by experienced Draughtsmen and Artists.
PERSPECTIVES. COMPETITIONS.
FINSBURY DRAWING OFFICE,
No. 113, PAVEMENT, LONDON, E.C. (near Bank).





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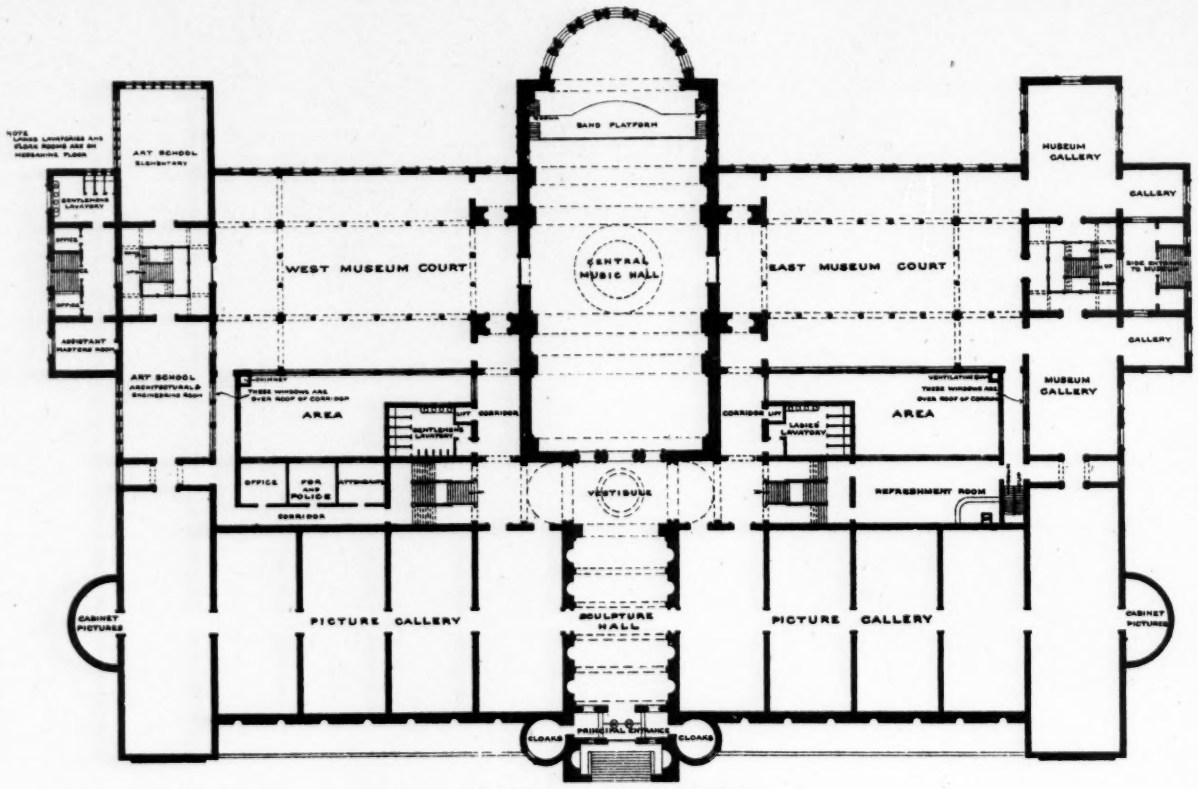
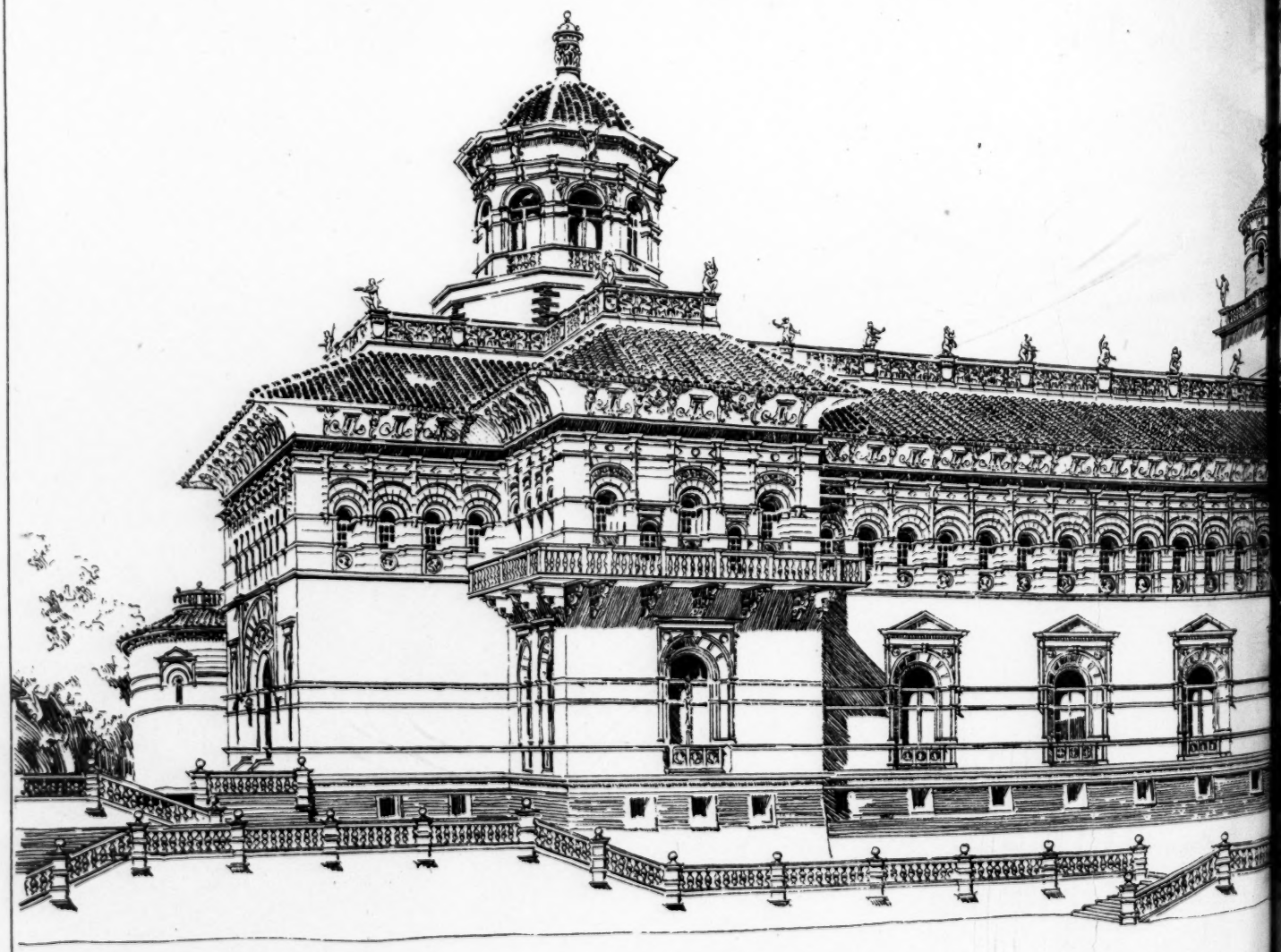
DESIGN FOR A CHAPTER-HOUSE.—By Mr. Heber Rimmer.

Soane Medallion, R.I.B.A., 1892.
Royal Academy Exhibition, 1892.



GROUND FLOOR PLAN.



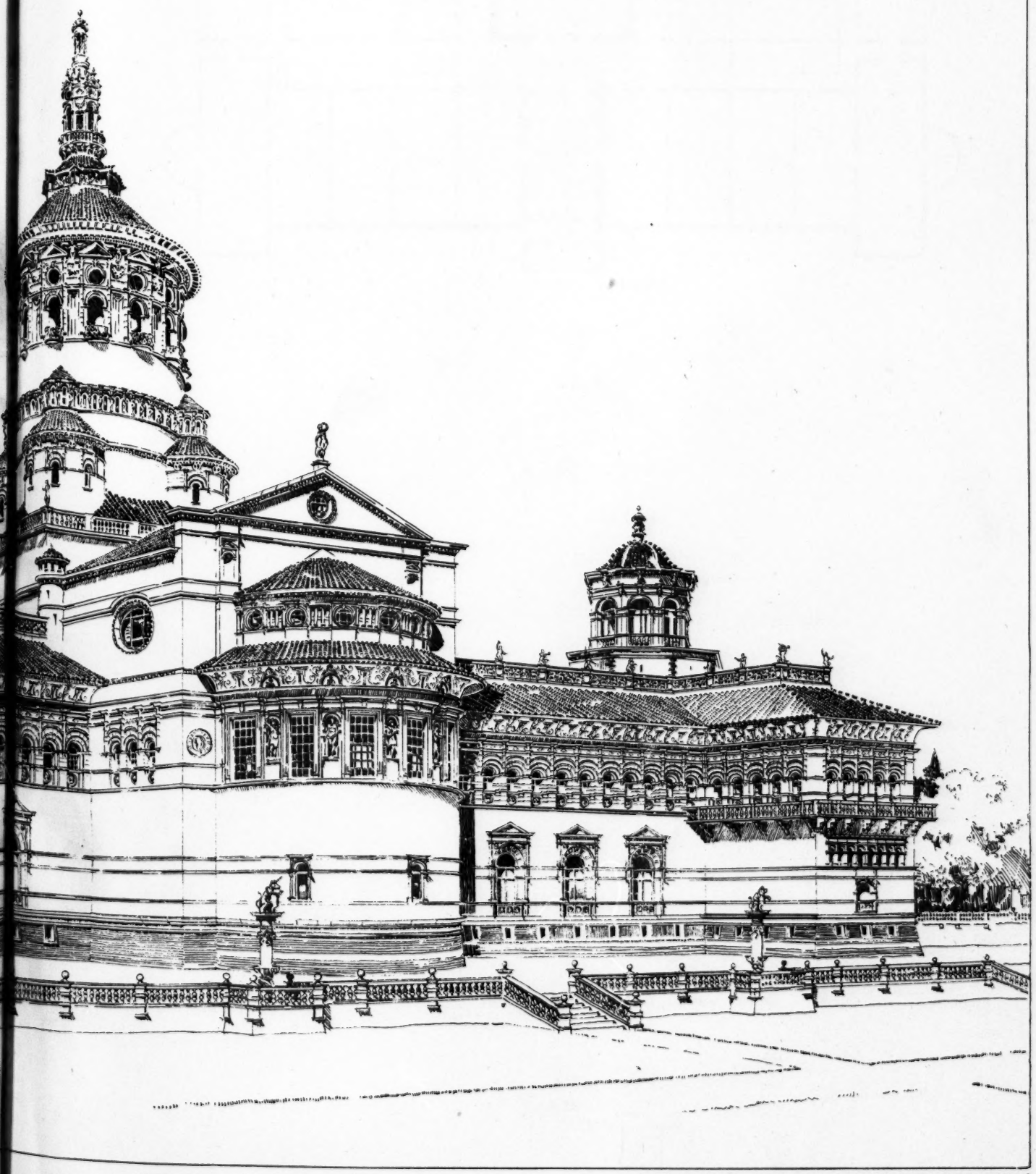
A. N. Prentice. Del. 92

COMPETITION DESIGN FOR GLASGOW ART

Royal Academy Exhibition, 1892.

·GLASGOW · MUSEUM · OF · ART · COMPETITION ·

·DESIGN · SUBMITTED · BY · AND · N · PRENTICE · ARCHT ·



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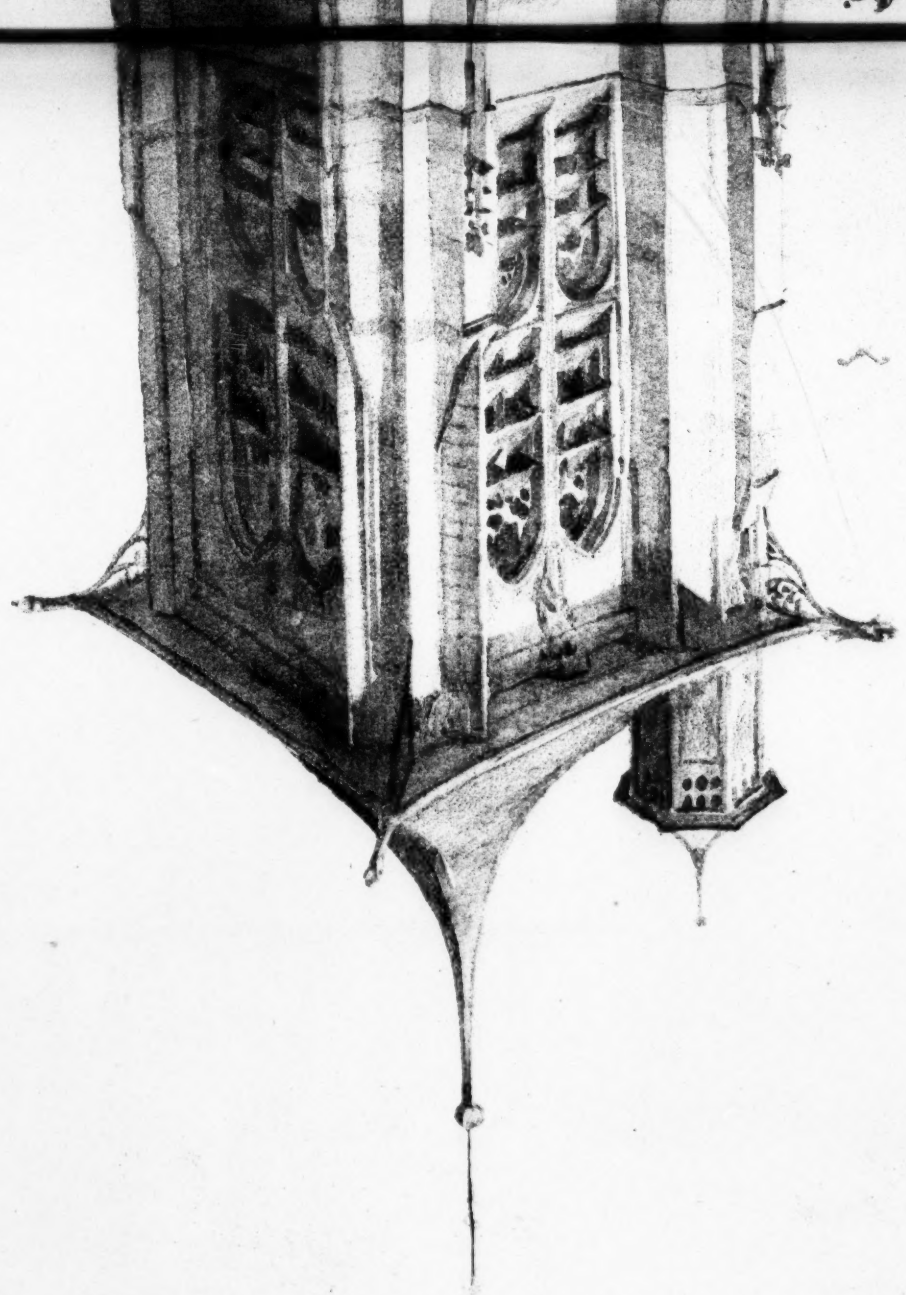
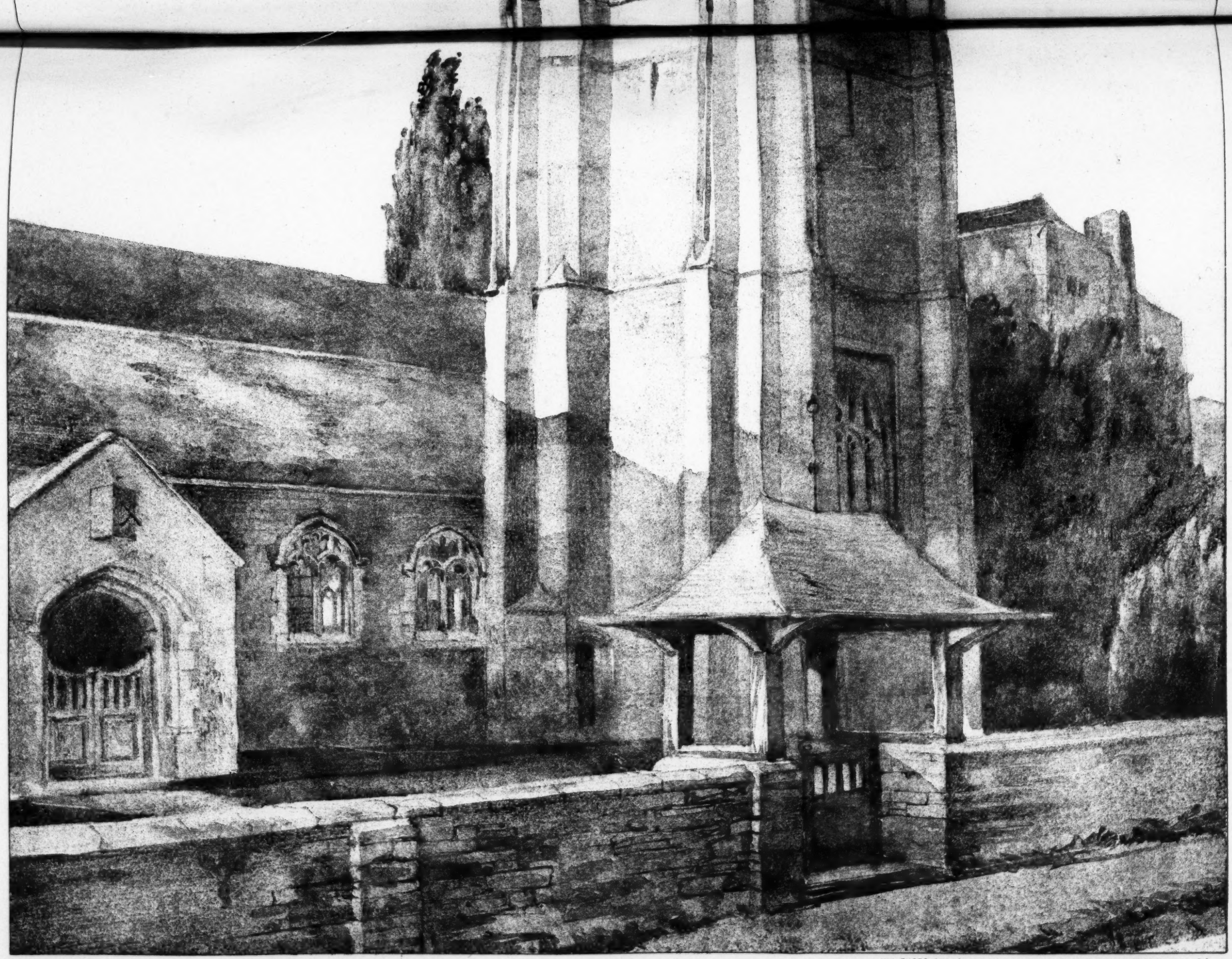
ALLERY.—By Mr. A. N. Prentice, A.R.I.B.A.





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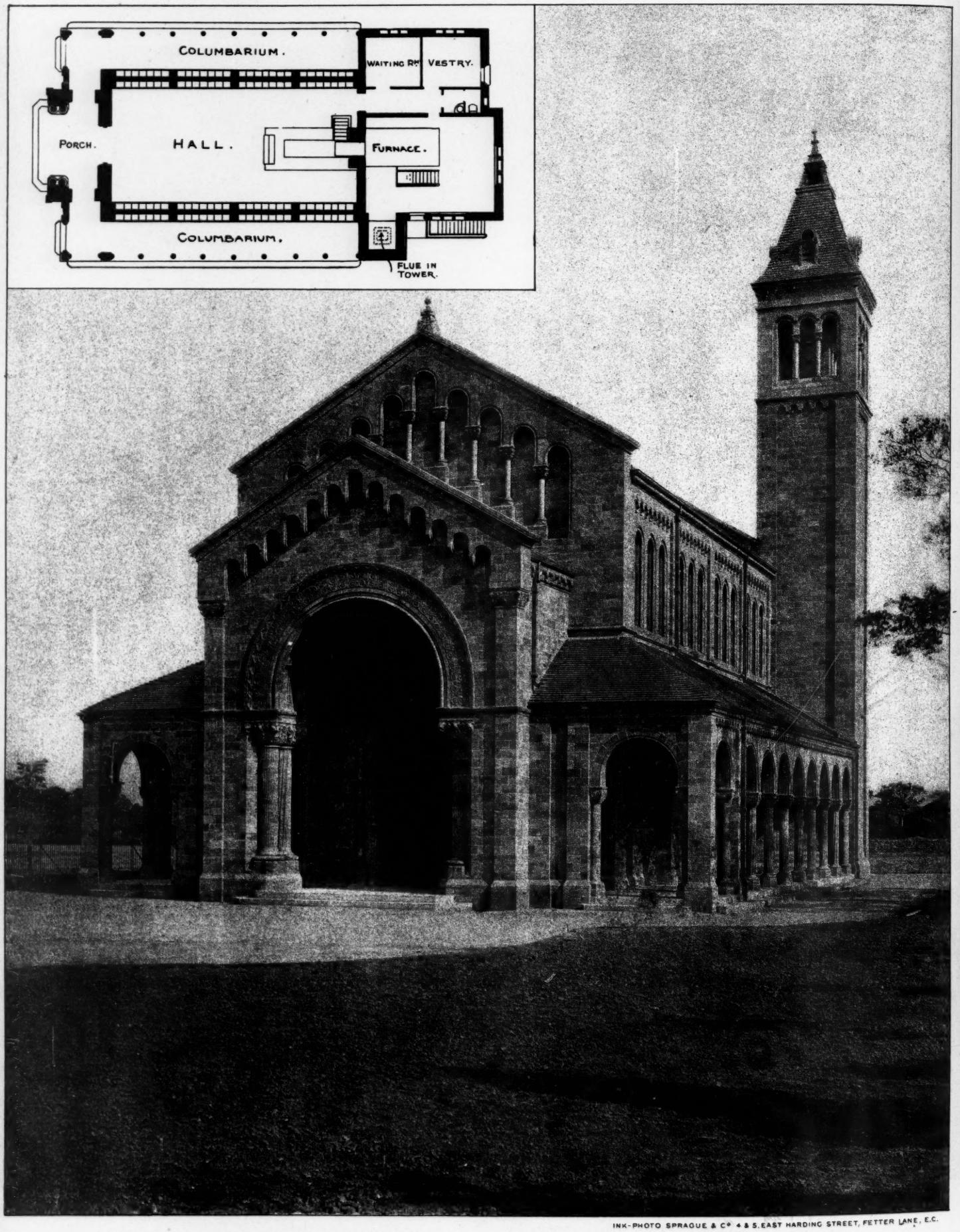
NEW TOWER, ST. MARY'S CHURCH, LYNTON.—Mr. H. Wilson, Architect.

Royal Academy Exhibition, 1892.



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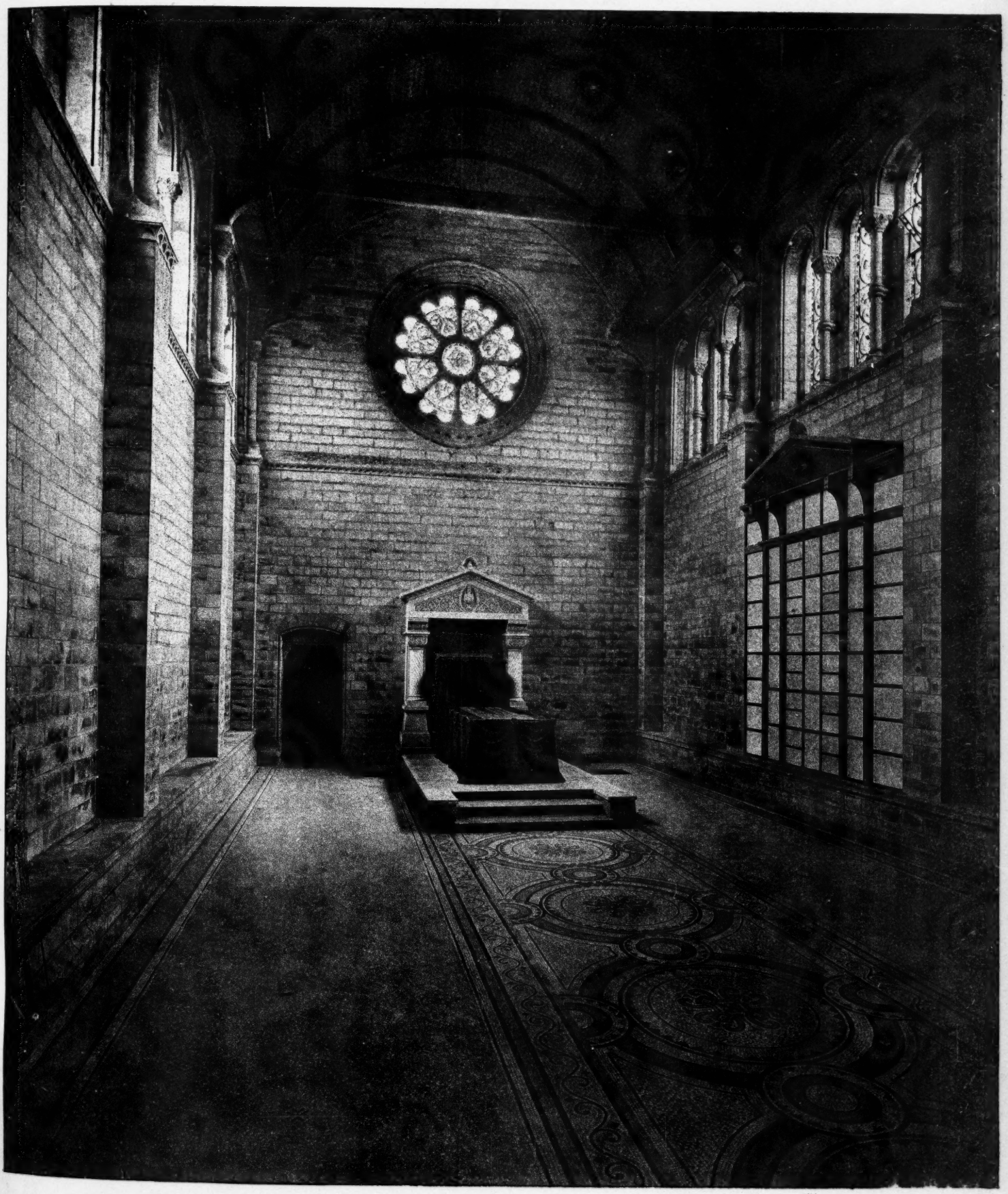
NEW CREMATORIUM, MANCHESTER.—Messrs. Salomons & Steinthal, Architects.

EXTERIOR VIEW AND PLAN.



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NEW CREMATORIUM, MANCHESTER.—MESSRS. SALOMONS & STEINTHAL, ARCHITECTS.

INTERIOR VIEW.